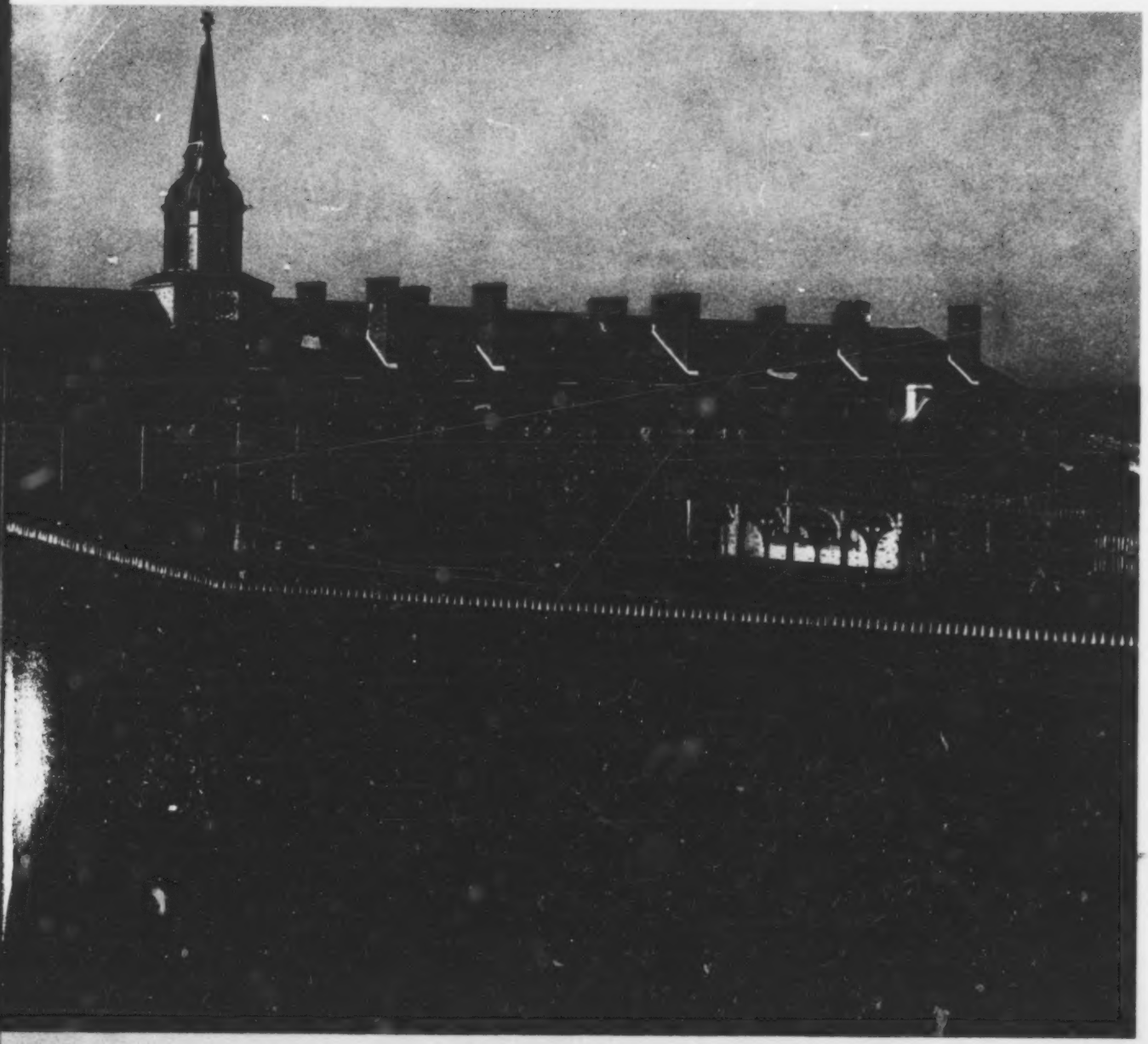
Occasional Papers in Archaeology and History No. 2
Contributions from the Fortress of Louisbourg – No. 1

Canadian Historic Sites



Archaeological Research at the Fortress of Louisbourg, 1961-1965,
by Edward McM. Larrabee

A "Rescue Excavation" at the Princess Half-bastion, Fortress of Louisbourg,
by Bruce W. Fry

An Archaeological Study of Clay Pipes from the King's Bastion, Fortress of Louisbourg,
by Iain C. Walker

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National Historic Sites Service
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Department of Indian Affairs and Northern Development
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Cover: The chateau at the Fortress of Louisbourg showing the townside Place d'Armes enclosed by pickets. The governor's wing is at the left end of the building.

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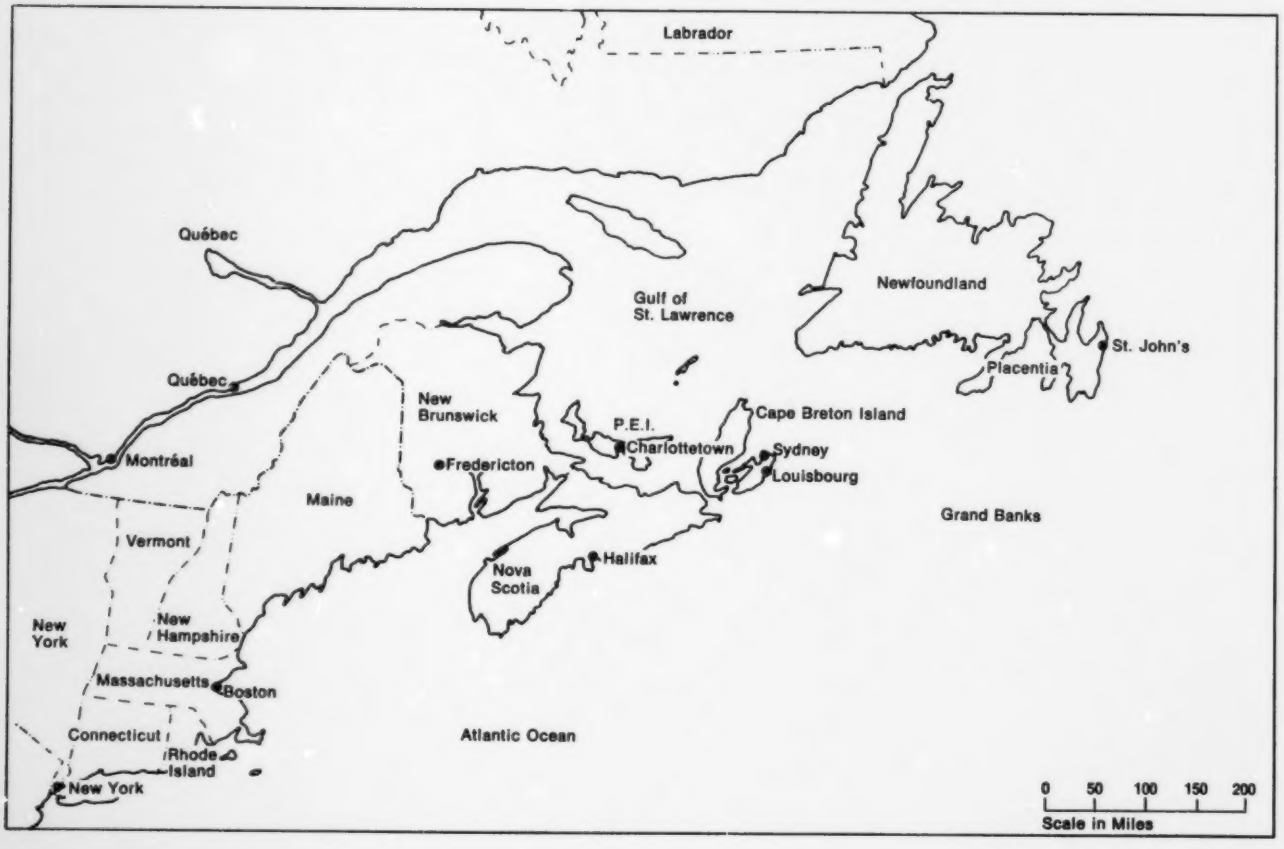
by Edward McM. Larrabee

1 Map of eastern seaboard of Canada and New England.



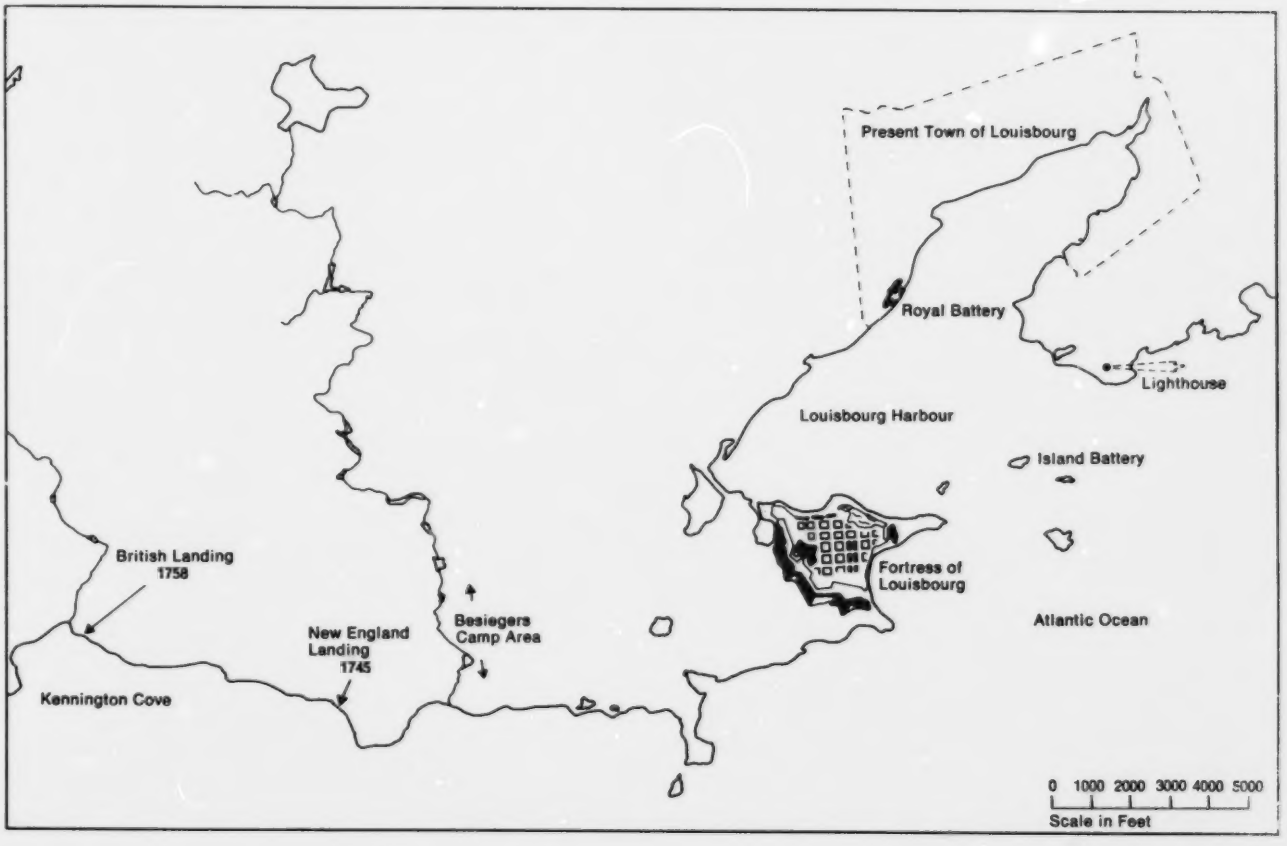
History of the Site

By the Treaty of Utrecht, 1713, France lost her major western Atlantic base of Placentia on the island of Newfoundland. She also lost Acadia (mainland Nova Scotia), and retained only Ile Royale (Cape Breton Island) and Ile Saint-Jean (Prince Edward Island). It was necessary to find a substitute port, which had to serve a variety of functions. The substitute had to be in a location that was close to the Grand Banks fisheries; that did not freeze; that was affected as little as possible by spring drift-ice; that was accessible to the important trade from the West Indies and Europe; and that could serve as a point from which ships-of-war could patrol the major approaches to the St. Lawrence River and the large French holdings in the interior of the continent. Finally it had to be a harbour which offered protection from storms and which afforded a safe place for the drying of fish, the outfitting of ships, the storing of goods, and the loading and unloading of merchant ships. Louisbourg (Fig. 1), near the eastern tip of Cape Breton Island, met these requirements.

The harbour of Louisbourg is about two miles long from northeast to southwest, with a mouth about one mile wide (Fig. 2). The effective width of the channel into the harbour is no more than a quarter of a mile, as islands and shoals close the southern part of it. The French fortified the harbour by means of a battery on the island in the centre of the harbour mouth; another battery faced the island and the entrance from the mainland; and a third battery was in the town itself. The latter was on the relatively low, flat peninsula, Rochefort Point, at the southern end of the harbour. As events in two sieges showed, the defences of the harbour were effective.

The landward defences of the town were not so successful because they could be

2 Fortress of Louisbourg and vicinity.

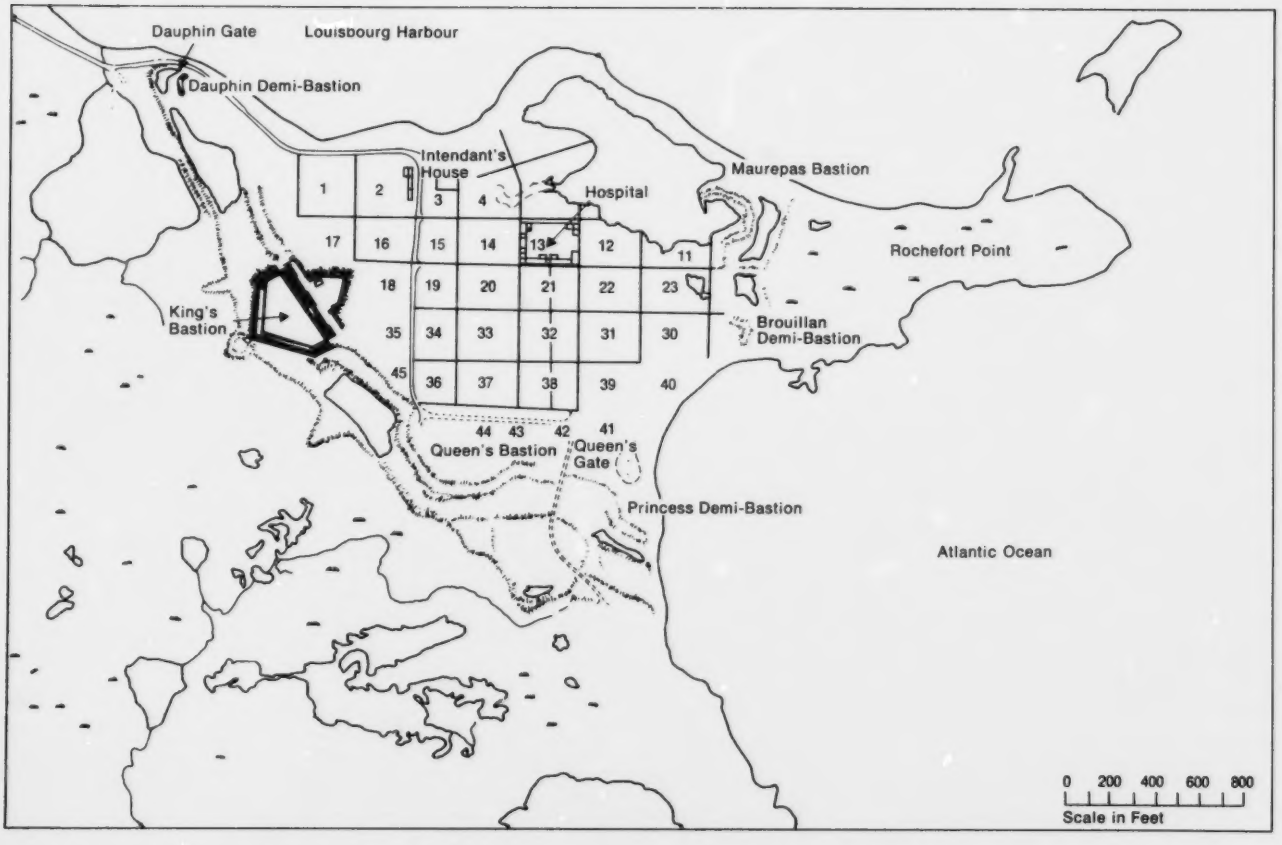


commanded by fire from hills to the west. These defences consisted of a double-crowned work running on a line south and east from the harbour to the sea (Figs. 3-4). Beyond these fortifications, which were founded on low hills in the glaciated terrain, were broad marshes that were expected to prevent any close approach of siege works. At a later date, one bastion and a demi-bastion were added to the seaward defences of the town at Rochefort Point. Enclosed within these walls was an area of nearly 60 acres in which a town was laid out on a rectangular grid of approximately 30 town blocks.

Effective construction began in 1720 and the major fortifications were completed after two decades of hardships resulting from the effects of a raw climate, salt air and poor materials on the masonry, difficulty in obtaining pay and supplies, an inadequate labour force, and possibly improper construction. The garrison of the fortress varied from about 1,000 to about 4,000 men. The normal civilian population of the town was probably never more than 2,000, although refugees from the farming areas to the north swelled the population in times of siege.

The first siege was conducted by New England forces in 1745. The Royal Navy provided the blockading fleet, but all other contributions were colonial. The besieging forces dragged cannon across what had been considered impassable marshes to the hills which commanded the main or west gate of the town at the Dauphin Demi-bastion. This was the weakest point in the defences of this irregular work. After a siege of seven weeks the walls were breached and an assault was prepared. The defenders were almost out of munitions since the siege had prevented any re-supply after the winter. At the pleading of the townsfolk, the garrison surrendered.

3 Fortress of Louisbourg.



The New England troops occupied the town and were eventually replaced by troops from Great Britain. The year after the Treaty of Aix-la-Chapelle, 1748, Ile Royale was returned to the French, who strengthened the fortifications of Louisbourg and stood a second siege in the summer of 1758. General Amherst was in charge of British forces, but the systematic and energetic attack was under the direct command of General Wolfe. Again the same weak points in the fortifications were battered. Again the French were caught short of supplies at the end of the winter, and the fortress surrendered. The main British base at Halifax had an excellent harbour and so the British had little need of Louisbourg. Fearing that at the forthcoming peace negotiations Louisbourg might again be returned to the French, the British systematically destroyed the fortifications (*see* Fig. 4 for craters resulting from the British demolition). The French occupants had already been sent back to France and the town was in a ruinous condition as a result of the siege. A small British garrison remained until 1768, when it was withdrawn to New England. The inhabitants of the town comprised a few ex-soldiers and settlers, chiefly from Ireland. The 19th-century occupation of the site consisted of a few families who fished and who farmed the now vacant space within the shattered walls, or grazed sheep on all that remained of the French town and its defences.

Disturbances of Area in the 20th Century
Before the present restoration project started, there had been some excavation of one sort or another at the Fortress of Louisbourg. This has affected all the subsequent work, and should be taken into consideration. During the first decade of this century, D. J. Kennelly "cleared the

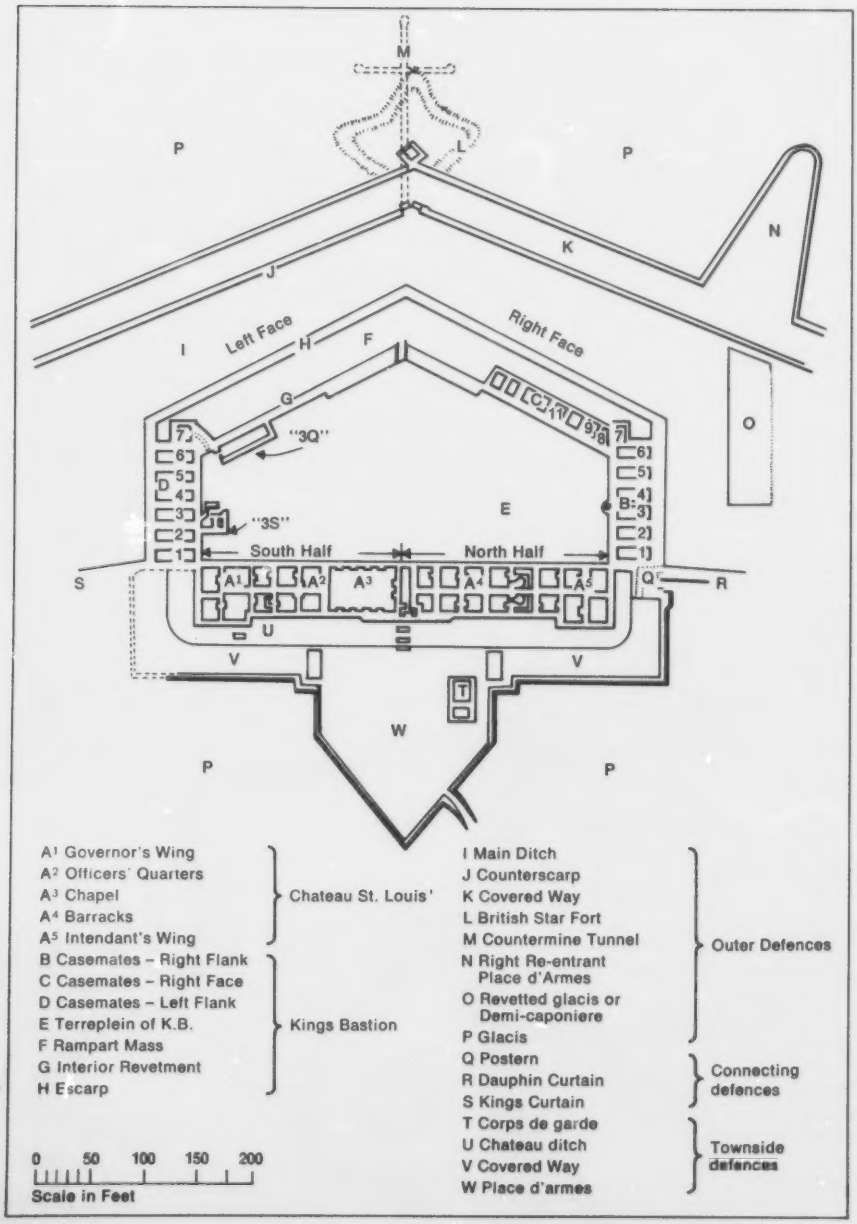
4 Vertical aerial photograph of the Fortress taken in the spring of 1961.

accumulation of the centuries" from several of the large casemates on the right and left flanks of the King's Bastion, and repaired the arches of these casemates (*see* Fig. 5 for terminology). He also did work on the outside of the left flank. In 1904, road construction crossed the ruins of the Chateau St. Louis and a monument was placed inside the King's Bastion in 1926. Other commemorative markers were also placed in this area which had been transferred to the Department of the Interior in 1928 from the Department of National Defence with the intention of eventually creating a National Historic Park in Louisbourg. Between 1928 and 1931, the dozen or so late 19th- or early 20th-century houses which were scattered over the fortress area were removed. The last of these were taken down when the Museum and Museum House were built in Block 34 in the mid-1930s. In 1940, Louisbourg was formally established as a National Historic Park.

During the 1930s there was major disturbance of the Chateau, a large amount of the upper level of earth was removed, and the entire outline of the Chateau foundation was stabilized above ground level. More stabilization and clearing, along the line of Kennelly's earlier work, was carried out in the casemates of the King's Bastion. Similar work was done also in the south row of rooms in the hospital in Block 13 and at the Intendant's house at the north-east corner of Block 2. While a number of "relics" were saved from this work and were put into the museum which was constructed on the site in the mid-1930s, there was no controlled excavation.

Similar haphazard work continued during the 1940s and into the mid-1950s. The entire perimeter of Block 13, enclosing the courtyard of the hospital, was stabilized, and the fill in the centre of the courtyard

5. Fortress of Louisbourg: the citadel.



was bulldozed away. There was some additional stabilization and repair at the Chateau. A road was cut through the Queen's Gate, and the cut stones found there were used to build revetments. The road also extended in front of the gate across the demilune and on to the glacis by the Princess Demi-bastion.

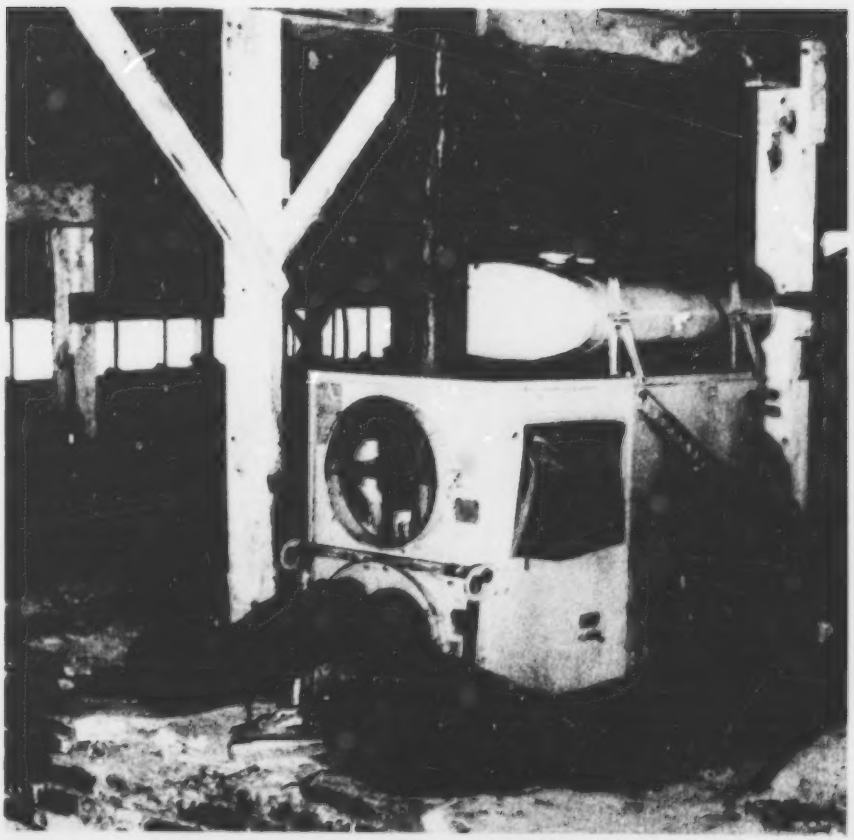
Thus by the end of the 1950s, many of the most important parts of the fortress had been affected by some sort of "development" or ruins-stabilization. None of this had been accompanied by archaeological investigation. In the summer of 1959, J. Russell Harper was sent to Louisbourg by the National Historic Sites Service to do the exploratory excavations which were to serve as an archaeological feasibility study. His work identified excavation conditions, several types of structures and artifacts, and the physical condition of buildings and objects in all important areas of the Fortress. Although his work was not intensive in any one area, it was useful for guiding later detailed investigation (Harper 1959).

In the summer of 1961, a group from Acadia University did a preliminary underwater archaeological survey of limited scope in the harbour of Louisbourg, and located a number of wrecks (Hansen and Bleakney 1962).

The Restoration Project

In the summer of 1961, the Government of Canada announced plans for the reconstruction of a substantial portion of the Fortress of Louisbourg. The project was to last for a number of years, to employ and retrain men, to put money into the area, and to build a worthwhile attraction for the tourist industry – all of which affects the archaeology. Work began that summer on the clearing of an area for administration buildings, laboratories and workshops. After the project started, a recruiting program was carried out to find the historians and archaeologists needed for research. This paper describes the extensive archaeological program carried out to provide a basis for accurate reconstruction.

Description of Archaeology



6 A heater with three ducts can carry hot air to different rooms under excavation in the north half of the Chateau. The shelter, with plastic windows and heat, made it possible to excavate during most weather.

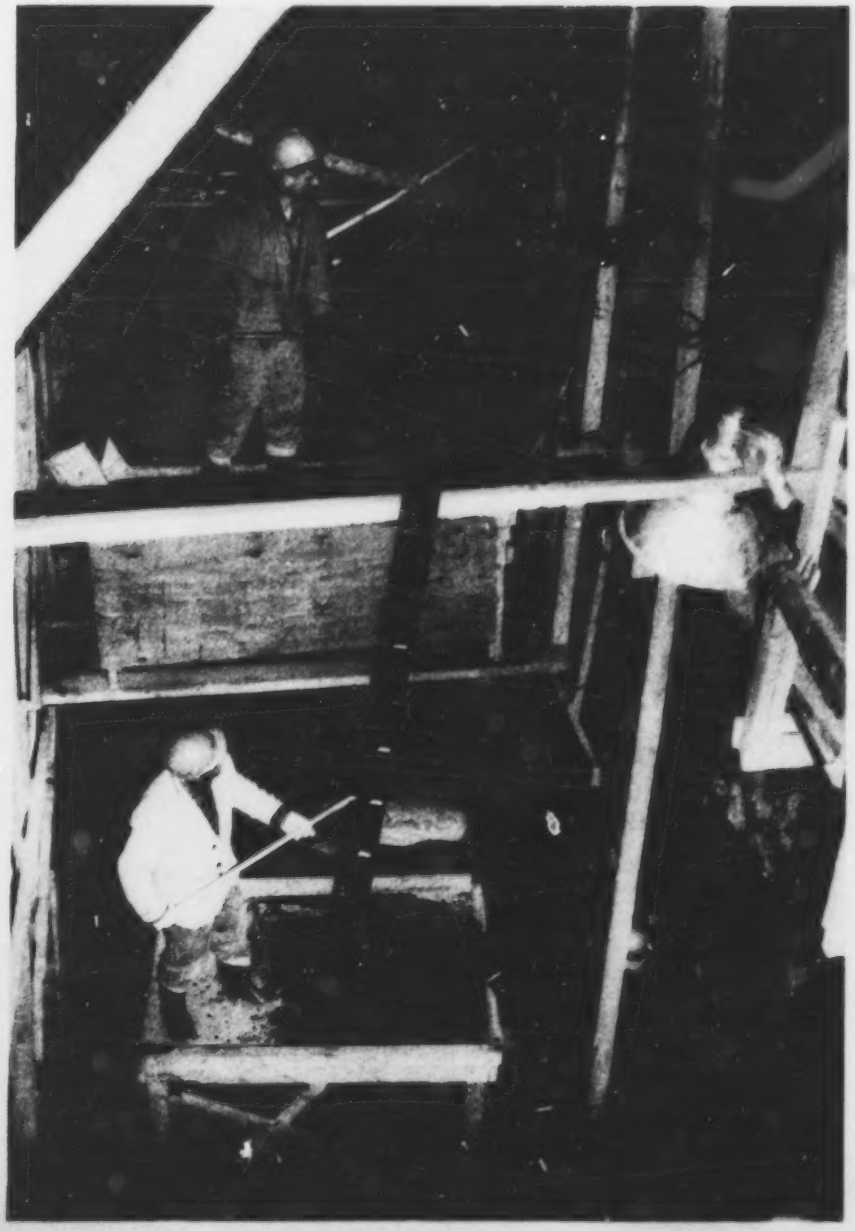
The following description of the archaeological research is organized by units of excavation presented in the chronological order in which the work progressed. As such, it is a narrative of the excavation with comments on each area rather than a full exposition of the results of the studies which have been made. The full account will not be possible until all the reports on separate areas have been synthesized into one over-all study of the archaeology of the citadel (the King's Bastion and the Chateau St. Louis, surrounded by the outer and townward works) at the Fortress of Louisbourg.

The various excavations and the studies resulting from them were planned so that such a comprehensive single study could be made; however, the specific way the citadel was divided into separate excavations, and the order in which these were dug, are largely a result of the construction schedule. Archaeology was required to provide specific information about structures where planning for reconstruction was already underway or about areas which would be buried, disturbed, or rendered inaccessible as a result of reconstruction elsewhere. Consequently, this description will seem heavily biased towards structural information. Such information was needed first in order that the reconstruction aspects of the work could continue. Furthermore, the structural units will seem disarticulated. A major element in the archaeological program, developed in the fall and winter of 1963-64, was the effort to fill in the pieces missing as a result of this necessary disarticulation and to concentrate and consolidate efforts which had been spread too thinly. This was part of a larger research program in which we were trying to bring archaeological and historical studies into proper sequence. An ordered dialogue between the disciplines would present the evidence and draw the conclusions for an accurate mental reconstruction of the citadel, and would record all the steps by which this reconstruction had been reached. This record would answer any questions which might be raised in the future about the research information upon which the physical reconstruction was based.

The condition of work required special adaptation. It is hard to convey the size of the site, or the difficulty of working on it throughout the year and against reconstruction deadlines. Shelters were built to cover many of the areas where intensive excavation was necessary, because even during the summer there is often rain to interfere with excavation. These shelters were heated during the winter to keep the ground from freezing and to make it possible for men to work in spite of the bitter weather (Fig. 6).

Equipment of all sizes was used for the removal of back-dirt and often for actual excavation. There were small tractor-mounted backhoes and a large power shovel available, as well as a bulldozer and a Michigan front loader. Conveyor belts and powered concrete buggies were also used, but most dirt was removed from excavations by wheelbarrows. Due to the difference in elevation in some places, such as the deeper casemates, elaborate staging was often necessary for removing the dirt (Fig. 7). The archaeological labour force which did this work ranged from about ten men to more than thirty in the summer.

7 The arrows show how labourers removed fill from Casemate 3 Right. In such deep areas scaffolding was used, and the dirt removed by stages after its initial excavation.



The work done under these conditions combined the pressures of the two kinds of "applied" archaeology. The first of these is general; the external conditions are controlled, but the results of excavation and analysis are not necessary for the progress of non-archaeological work. This is "salvage" or "rescue" archaeology. The work here was like salvage archaeology in that any information which could not be rescued in the reconstruction area would be irrevocably destroyed by the process of total reconstruction.

The second type of applied archaeology is specific. It involves an external agency which has requested certain particular information. At Louisbourg the archaeology was specifically applied because fully half the decisions upon which a detailed plan of reconstruction could be made were based on the analysis of excavated data. The alignment and slope of walls and particularly the elevations of related features were barely suggested by historical data, despite the mass of cartographic evidence available. Such facts are necessary for reconstruction and could come only from excavation. Most of the details of appearance which give reconstruction an accurate atmosphere, concerning cut stones, bricks, rubble masonry, slate, mortar, building hardware and furnishings come from archaeology.

The problem was particularly pressing because data, which it might or might not be possible to "salvage," in the first sense, were "required" in the second sense. As a further feedback effect, the results of whatever specific findings it was possible to present might affect the course of the reconstruction in progress, and so aggravate the threat of destruction to some other area which would then have to be salvaged.

I should like to express my thanks to Mr. J. D. Swannack, Jr., Supervising Archaeologist, and to the members of the archaeological staff at the Fortress of Louisbourg who have helped with the preparation of this report and who have read the portions concerning their work. However, I am responsible for any inaccuracies. Mr. Fred

Allen, research illustrator for the archaeology unit at Louisbourg, prepared and drew the maps for this paper, and Mrs. Yvonne McNutt, archaeological administrative assistant, worked very hard to make certain that the drafts and other material were produced. Mr. B. C. Bickerton, then Senior Historian, also gave helpful advice.

Fall, Winter, Spring, 1961-62

John H. Rick was sent by the National Historic Sites Service on loan to the Fortress of Louisbourg Restoration Section to help start archaeological research. He investigated the Royal Battery, which is halfway around the harbour, for a few weeks in the fall of 1961 and in the spring of 1962. He also initiated the basic artifact recording system. Also, at the same time, surveys were made in the surrounding area for outlying siege works by John R. Graham (1961, 1962).

Summer, 1962

Excavation was under the direction of James H. Howard, who arrived at the beginning of the summer and who stayed for the season (Howard 1963a, b). Iain Walker, the first staff archaeologist on the project, also arrived at this time. All work was concentrated in the citadel, with some excavation in the Chateau and in some of the casemates during wet weather, and major trenching was done across the fortifications of the King's Bastion to the outer works. This could best be described as a "general" excavation, in which there was digging done in every major type of unit existing in the bastion and Chateau itself. No one of these was fully investigated.

Main Ditch and Escarp

Major trenches were cut across the fortifications from the interior of the bastion to the covered way of the outer works. These did not provide any stratigraphic information, but did locate the major stone revetting walls of the citadel. Clearing both faces of the bastion was started, with the major objective of locating the flanked and the two shoulder angles. A few cut stones were found at the left shoulder and flanked angles, but the right shoulder was completely destroyed. The search for it produced the most dramatic find of the summer: a crudely-made lead box inside which was a wooden block with three chiselled holes containing two copper or bronze medals and one silver medal. Except for material, the medals were identical, and dated 1720, commemorating the construction of Louisbourg. They had the head of Louis XV as a youth, modelled by LeBlanc, and on the reverse side of the medals was a projection of what Louisbourg would eventually look like. Historical research showed that 18 such medals had been struck and sent to Louisbourg to be placed at the corners of major units of construction or royal buildings. One identical medal had been found previously, when the foundations of the French lighthouse were stabilized in the 1920s.

Work Outside the Bastion

Stephen J. Gluckman was in charge of an underwater survey done that summer (1963a, b). This survey located all the known wrecks and some hitherto unknown on the harbour bottom, so that they could be studied in the future. A preliminary attempt was made to identify each of these with known French ships which had sunk. (The harbour and vicinity are under protection to prevent disturbance of these wrecks.) Patricia L. Gall was in charge of the processing of artifacts in the laboratory (Gall and Lynch 1962). There were six site assistants (undergraduate or graduate students who acted as recorders) during the summer of 1962.

Fall, Winter, Spring, 1962-63

Walker was in charge during this period, as the Senior Archaeologist did not arrive until the beginning of the spring. Excavation continued uninterruptedly in the citadel, and because of the weather, this was almost entirely under shelter (Walker 1963). Although some of this work was in the left flank casemates, most of the work was done in the Chateau. During this period, the main ditch of the bastion was cleared by machinery, and the exposure of the escarp of the two faces was completed. Kathleen R. Lynch was in charge of the laboratory. In the fall, Walker supervised the excavation of a well found during the course of deepening the basement of the First United Church in the modern town of Louisbourg (1964a).

Summer, 1963

Walker continued as Staff Archaeologist. The author arrived as Senior Archaeologist in March and Peter D. Harrison was Seasonal Staff Archaeologist during the summer. Work concentrated on the circuit around the terreplein of the King's Bastion. The left flank casemates (reported on later by Jeremy B. Akerman 1965) and the right face casemates (Harrison 1964) were completely excavated and work was started on the right flank casemates. Outside the bastion some work was done on the left flank escarp and part of the adjacent curtain. Some clean-up was done at the English star fort in front of the bastion, and exploratory excavations were made on the right re-entrant place d'armes on the outer works in front of the right shoulder of the bastion. The remainder of the Chateau, with the exception of a few rooms and the chapel, was also excavated by the end of this summer. John V. N. Dunton arrived as Conservator to be in charge of the artifact processing and study. There were ten site assistants.

Left Flank Casemates

These were six vaulted chambers each about 35 ft. long and 12 ft. wide filling the space between the escarp (or outer wall) and the interior revetment of the left flank. A seventh casemate, an almost square chamber behind the left shoulder of the bastion, was entered by the *corne de vache* passage. The vaults and ends of the first three casemates were almost intact, partly due to repairs and some reconstruction by Kennelly. For this same reason, the interior fill of these chambers was of relatively little interest, because much of it had been re-

8 The right face casemate foundations were exposed after their shelter had been blown down by a high wind in December 1963. This view is looking north, toward a shelter being constructed over the right flank.

moved or disturbed during the first half of the 20th century.

Construction of these seven casemates began when the main walls in this area were built in 1722, and they were completed and covered by 1725. They were not more than a few feet deep below the terreplein of the bastion and did not accumulate much fill. This was shown by the condition of the last four casemates, where the casemate vaults had collapsed primarily due to the 1760 demolition. The resulting sealed deposits represented the entire period from the early 1720s to 1760, yet they were comparatively sterile of artifacts. All evidence, historical and archaeological, suggests that these latter casemates, and perhaps all of the left flank, saw very little use except as shelters in the time of siege.

The structural remains preserved on the left flank were important in visualizing missing portions of the bastion. In Casemate 6 Left, the door was found warped but otherwise intact up to about two-thirds of its original height, and the two vents were undisturbed. The vents and doors in Casemates 2 and 3 Left were disturbed and partly rebuilt by Kennelly, but investigation showed that many of their features were original. There were traces of doors in Casemates 4 and 5. Nowhere else in the bastion were such complete remains present.

Right Face Casemates

Beginning in 1720, the foundations of eight small casemates were constructed along the interior revetment of the right face near the right shoulder (Fig. 8). By 1725, when work was shifted to other parts of the fortress for six years, the two casemates next to the shoulder (8 and 9 Right, since the numbering starts on the right flank) had been vaulted. A decision was made not to complete the other casemates (10 to 15 Right). However, a temporary powder magazine was established in Casemates 11 and 12 Right, which had some masonry wall construction and a wooden roof added for this purpose.

All these casemates (each about 11 ft. wide by 16 ft. long) then stood until 1731. The doors of Casemates 11 and 12 were blocked and the temporary roof removed at probably this same date. By 1732 only Casemates 8 and 9 were still open. They seemed to have collapsed during the thorough demolition of the right shoulder area in 1760. Casemates 10 through 15 were filled with earth and ceased to exist except as buried foundations after 1732.

Thus Casemates 8 and 9 had one story to tell (with differences between the two), 10, 13, 14 and 15 another (having been open foundations for a decade and then filled), and Casemates 11 and 12 yet another history, involving the temporary magazine. These differences were reflected in the stratigraphy (which distinctly showed the dislocation caused by the demolitions) and by the contents. Fortunately, the two with the longest history were also the deepest (as much as five or six feet below the terreplein in places) and so had a continuous record of use (Walker 1966b).

In the case of Casemate 8 Right, this use seems to have been partly for sewage, as the floor at one phase was cobbled, and a cut stone drain was set into it. An interesting find in Casemate 8 was an undisturbed stump left *in situ* by the French when they were clearing the hill and building the walls, and buried almost immediately when the floor level was raised. The buried forest floor material (The A° zone of the Louisbourg Iron-Pan Podsol which was characteristic of this site; soils of the fortress area were studied by MacDougal 1964) was recognized in the central areas of a number of other casemates but had been disturbed by wall trenches or construction around the edges. Much informative material, especially construction hardware, was found during these excavations.

Star Fort

This was the name commonly given to a small earthwork redoubt with three salients which the British constructed after the demolition of the 1760s. It was built at the flanked angle of the outer works, over the covered way, and its ditches were cut into the French glacis. The access to a wooden blockhouse inside was provided by a causeway, built of robbed stones and fill, which ran from the area of the flanked angle of the then ruined bastion across the partially filled ditch. Excavation revealed the size and shape of the masonry foundations of the blockhouse, but this post-French structure, abandoned or dismantled when the British left the fortress, has not received thorough study. The star fort and causeway can be seen quite clearly in front of the bastion in the 1961 aerial photograph (Fig. 4).

Fall, Winter, Spring, 1963-64

Larrabee and Walker continued on the staff, Bruce W. Fry was added as second Staff Archaeologist during the fall, and Donald L. MacLeod during the winter. Excavation continued during the winter, as it had the previous winter (Fig. 9). By the end of this time, investigation of the circuit around the terreplein of the bastion had been completed. The right flank casemates (MacLeod 1965) and the remaining rooms in the Chateau, with the exception of the Chapel, were completely excavated and the left flank escarp was completely exposed.

Dunton continued organizing the work in the laboratory and commenced the systematic study of the artifacts, and Jeremy B. Akerman arrived as archaeological artist-draftsman (a title later shortened to Archaeologist-Illustrator). By the end of the spring it had been decided to increase the staff further so that a major effort could be made to push the archaeological research ahead of construction. A similar effort was undertaken in the historical research at this time. There was a recruiting campaign and the staff was organized in such a way as to improve the quality, speed of production, and pertinence of the archaeological reports. Excavation was aimed toward obtaining thorough information from areas which were going to be completely removed or changed and reconstructed, such as the Chateau and casemates; less critical areas, such as earthworks, were excavated less intensively and more economically by test-pits and trenches. Thus, this was to be both salvage archaeology of the most necessary sort, and archaeology providing a practical base for accurate reconstruction. There was one site assistant during this winter.

Chateau St. Louis

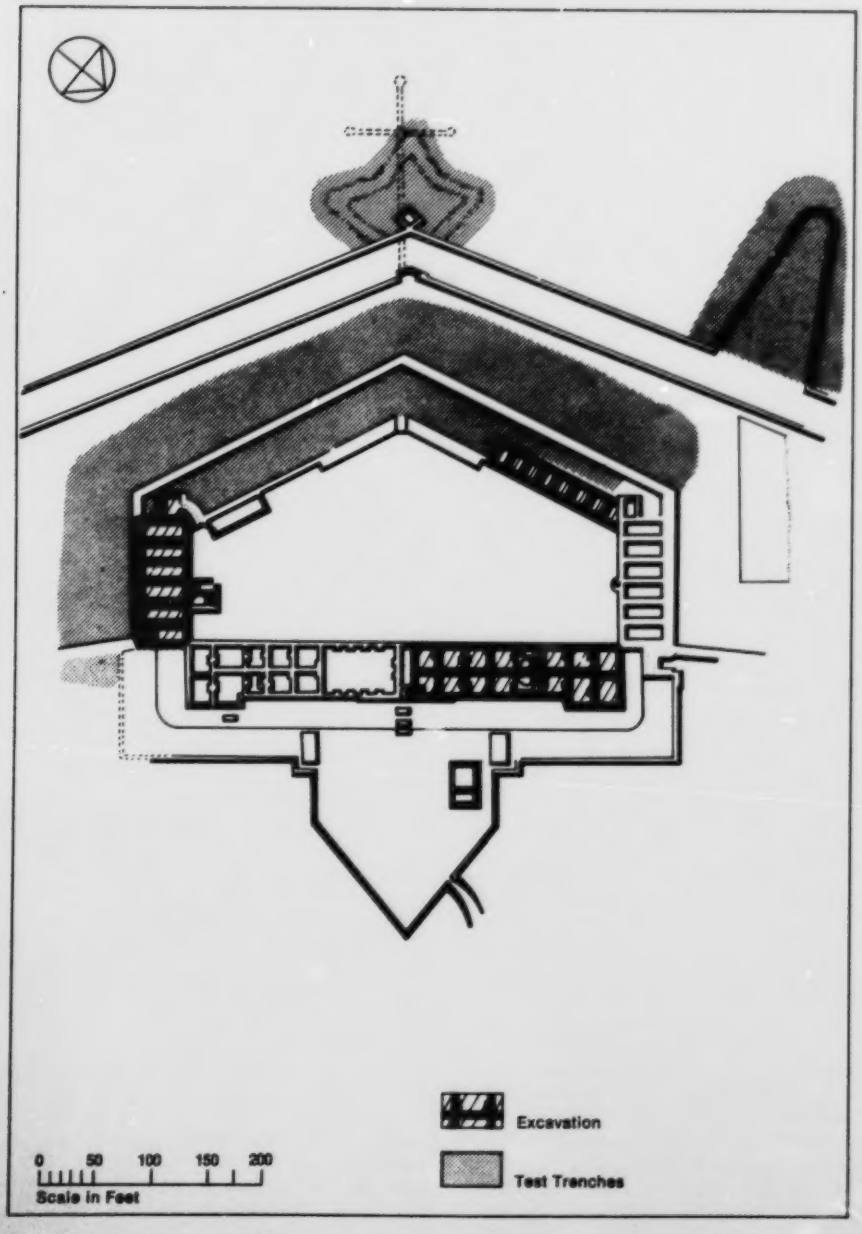
This structure was about 360 ft. long and from 45 ft. to 52 ft. wide (Fig. 10). There were 26 separate cellars in the basement, not counting the two ovens and the three small spaces by the drawbridge and central passage. Only a portion of this basement was used because it was never excavated to a depth sufficient for use. The rooms were about 20 ft. square, except the four longer rooms in the wings at each end.

For convenience, the Chateau was considered and studied in three major sections. One of these was the north half (Walker 1964b), with four rooms in the Intendant's wing (in which no Intendant of the Fortress ever lived), and twelve rooms under the barracks portion of the building. The two bread ovens were in the centre of this half. The dampness in the cellars finally caused the French to abandon these ovens and bake elsewhere in the Fortress; however, the ovens – one in good condition – were important because they were largely untouched by work in the 1930s.

The next unit (excavated and discussed later) was the Chapel (Vogel 1965) across the central passage from the barracks half of the building. Beyond that was the south half (Fry 1964c) of which the Chapel was really a part. Next to the Chapel were six rooms under the officers' quarters and then four rooms under the Governor's wing The only basement feature of interest in the officers' area was a possible cistern, but in the Governor's wing two of the basement rooms were cobbled, having served as wine cellars.

The excavations of the north and south halves revealed the entire foundations of the building and showed that many alterations and variations from the historic plans existed in important features such as door-

9 Fortress of Louisbourg: the citadel, fall, 1963.



ways and fireplace bases. Excavation uncovered hundreds of the cut stones which had once adorned some of the doorways, windows, and fireplaces so that reconstructions of some of them could be made.

The excavations also produced many thousands of artifacts which are providing the basis for some of the first efforts to define types of ceramic vessels in use at Louisbourg. The bulk of garbage and debris accumulated during the occupation of the Chateau was perhaps deposited elsewhere, such as the Chateau ditch and subsequently the right flank casemates; however, a great deal of material was used in the Chateau fill, such as room E in the Governor's wing which had been filled with earth in which were mixed many fine faience pieces.

The debris from the collapse of the structure during sieges and after abandonment had fallen into the basement spaces. Except for the destructive removal of fill above 35 ft. elevation during the 1930's, this remained untouched. This large central building of the French royal administration could well have been described as still containing a gold-mine of information when the project started.

Louisbourg has had magnetic declinations recorded since the 18th century, and the site provided an excellent control for starting a thermo-remanent magnetic dating grid in northeast North America. This could have had practical use in the reconstruction by helping to date unknown fireplaces and ovens. For this purpose, samples of bricks were taken from two Chateau ovens. Hugh Bergh of Princeton University analyzed these samples.

Right Flank Casemates

These casemates were of the same horizontal dimensions as those on the left but, due to the original slope of the land on which the French built, the right flank casemates were much deeper. Their vaults and doors were at approximately the same elevation as those on the left flank; however, the foundations of these right flank casemates were in some cases as much

10 A shelter is under construction over part of the north half of the Chateau in the summer of 1962. The wooden bridge across the Chateau ditch was built during the 1930's. During the same time a single monument was erected in the Chapel, beyond which is the south half of the Chateau. The view is southeast.

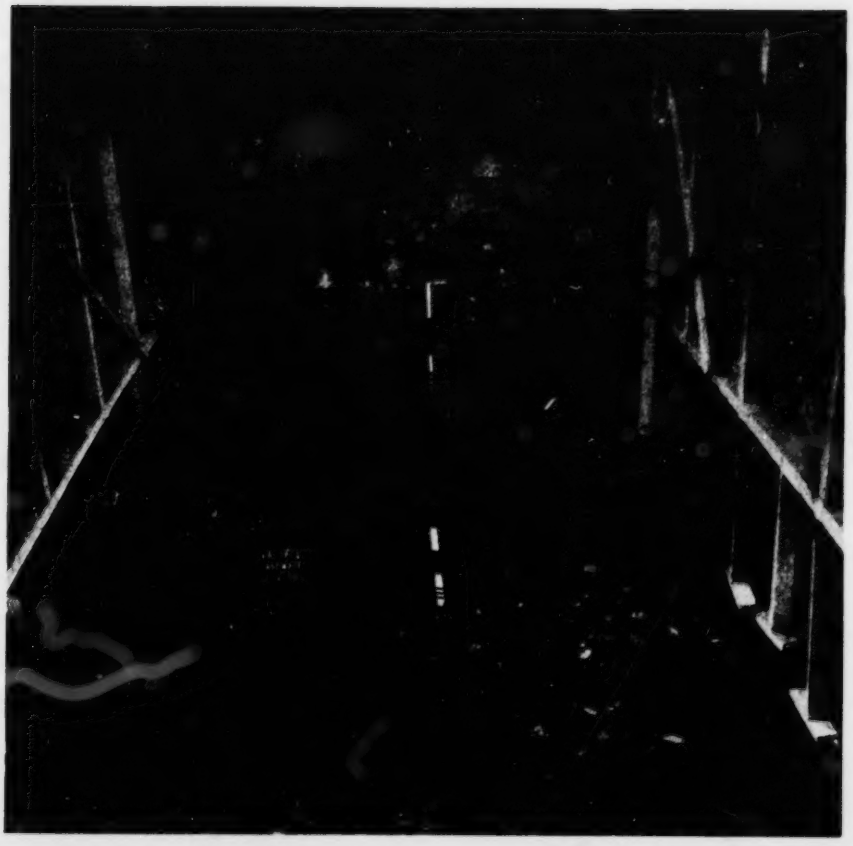
as 14 ft. below the terreplein level.

In most cases, this great depth was filled during the 18th-century occupation of the Fortress to within a short distance of the terreplein. This was done in stages, and appears to have been the result of intentional actions to fill undesirable space or to find a place to put a large amount of debris at one time. The casemates do not seem to have been filled by gradual midden-type accumulation.

Probably there were as many artifacts, originally from the Chateau, found on the right flank as there were found in the Chateau itself. This was due to periodic cleaning and filling. In one case, we know of the decision of the French, when they reoccupied the fortress in 1749, to clean an accumulation from the Chateau ditch and place it in the right flank casemates. Thus, the casemate fill could in many cases be referred to as secondary or redeposited material rather than as a primary accumulating midden. In any event, it was very rich with artifacts, especially ceramics and tobacco pipes, the latter studied by Walker (1965a; 1967b, c) and by H. Geiger Omwake (1965). Conditions were good for the preservation of cloth (possibly bandages, uniform parts, a felt hat, etc.), ivory (a religious figurine), wood, and other normally perishable materials.

In the right flank casemates, as in the right face casemates, there was evidence of the pre-construction ecological conditions. What had once been swampy forest floor was still preserved with many roots and small stumps intact in one of these casemates. Present in another was a drain used during the early phases of construction of the bastion to drain the terreplein area. It had been blocked at a later date, but confirmed the existence of a drain indicated on maps.

11 After the wooden floor structure in Casemate 1 Right had been fully exposed, it was recorded photographically. The scaffold supports a reinforced plywood lining inside the casemate vaulting, to eliminate the risk of falling stones and to reduce dripping on excavated areas after rain.



Stratigraphic evidence showed that there were excavations made by the French to repair and largely reconstruct the escarp at the outer ends of these casemates. Study of the artifacts contained in the well-preserved stratigraphy was particularly important because it provided confirmation that certain repairs (that is, the intrusion to certain levels at which repairs were visible in the wall) fell within particular dating brackets. This showed that the intrusion and repair or reconstruction must be certain ones referred to in documents, rather than other possible disturbances. This helped the present reconstruction to simulate the appearance of features present at a specific date.

One major problem was the interpretation of evidence for drainage. Drains were found leading into Casemate 6 Right and from 8 Right into and out of 7 Right, the square corner casemate. It is likely that the two drainage systems represent two periods. The problem was made more difficult to resolve due to the total demolition of the right shoulder area in 1760. Pieces of a cut stone drain opening were found in the rebuilt 1755 escarp (Fry 1966).

The remains of a wooden floor support structure was found in Casemate 1 Right (Fig. 11). This confirmed historical evidence to the effect that at least some of these deep casemates were used with wooden floors near terreplein level. The lower parts were either filled, left vacant and unused, or in one or two cases, according to documentary evidence, used as dungeons.

Left Flank Escarp and Fill

This escarp was originally a wall about 130 ft. long and 8 ft. thick at the base. Its height from an irregular foundation to a relatively level cordon at the top varied between 18 and 24 ft. The first stage of the history of the fill against this wall was one of gradual accumulation – a normal course of events according to documentary evidence and forts of the period which are still standing.

After the siege of 1745 and the occupation by the English and re-occupation by the French, the outer portion of this escarp, from Casemate 4 towards the shoulder, was in very bad repair. The same was true of a portion of the curtain wall near the re-entrant angle, by the drain. Shortly before the second siege the French made interim repairs to various parts of the fortifications. They revetted the damaged portions of the escarp and the curtains here with earth. This has been proven because the level construction strata of the French earth-cover went into holes and cavities in the masonry of the escarp. Between the two damaged areas, behind Casemates 1 to 3, the escarp was in good condition, except for a slight bulge behind Casemate 3 which may have occurred during the original construction. However, it was also necessary to cover this portion with the same earth fill to avoid having a blind area or hiding place in which enemy infantry might be able to hide if they reached the ditch. The earth covered the opening of the drain and filled the channel, which action was also shown in the stratigraphy. This was done only one or two years before the second siege so that the long-range effect on the terreplein drainage due to the blocking of this drain is not known. Probably what small part of the terreplein drained

12 The left flank escarp stands at the left of this picture, which is looking northeast, toward the King's curtain. The organic line of turf and fascine revetment which held the earth against the wall is seen as a smooth band with a slope of about 1:1 from the right up toward the left, with short extensions (probably fascines projecting into the fill) between construction levels of tamped earth. A later drain (probably Kennelly's) is on top of the pedestal with the 6-ft. range pole. The man is standing above cut stone No. 569, which was numbered before removal from this debris.

in this direction was served by the small drain into the Chateau ditch.

The earth used to secure this escarp was tamped in layers; it was revetted with fascines which showed as evidence of an organic layer in the excavations. The earth revetment had an outer slope of about 1:1. By projecting the eroded and missing portion we could see that originally it reached to within a few feet of the cordon. The earth rested against the escarp wall which, in its undamaged and undisturbed portion behind Casemates 1 to 3 was found with a slope of approximately 8:1. The construction strata extended tight against the wall and showed no evidence of dislocation or compression, even at the area of the slight bulge. Therefore, the wall must have stood at this angle when the earth was piled against it. Since the escarp had not separated from the casemates at all, nor showed signs of cracking, it is unlikely that it moved *before* the earth was placed in this location. Although documentary sources state that the French intended to build a 6:1 slope, our findings indicate that this was not always the case at Louisbourg.

The use of earth by the French here made possible the excavation and study of a beautifully preserved section of original French masonry. About one-half the length of this entire escarp up to approximately two-thirds of its height, or a total of about one-third of the entire original wall, was preserved intact. Although much of the mortar had leached out, there were even some portions still evident of the heavy mortar rendering used to hold chinking stones in place. From this well-preserved wall and the earth against it, it was possible to study both permanent masonry and temporary earth construction methods used at the Fortress (Fig. 12).

It was also possible to study closely the methods of destruction used by British

13 Fortress of Louisbourg: the citadel, fall, 1964.

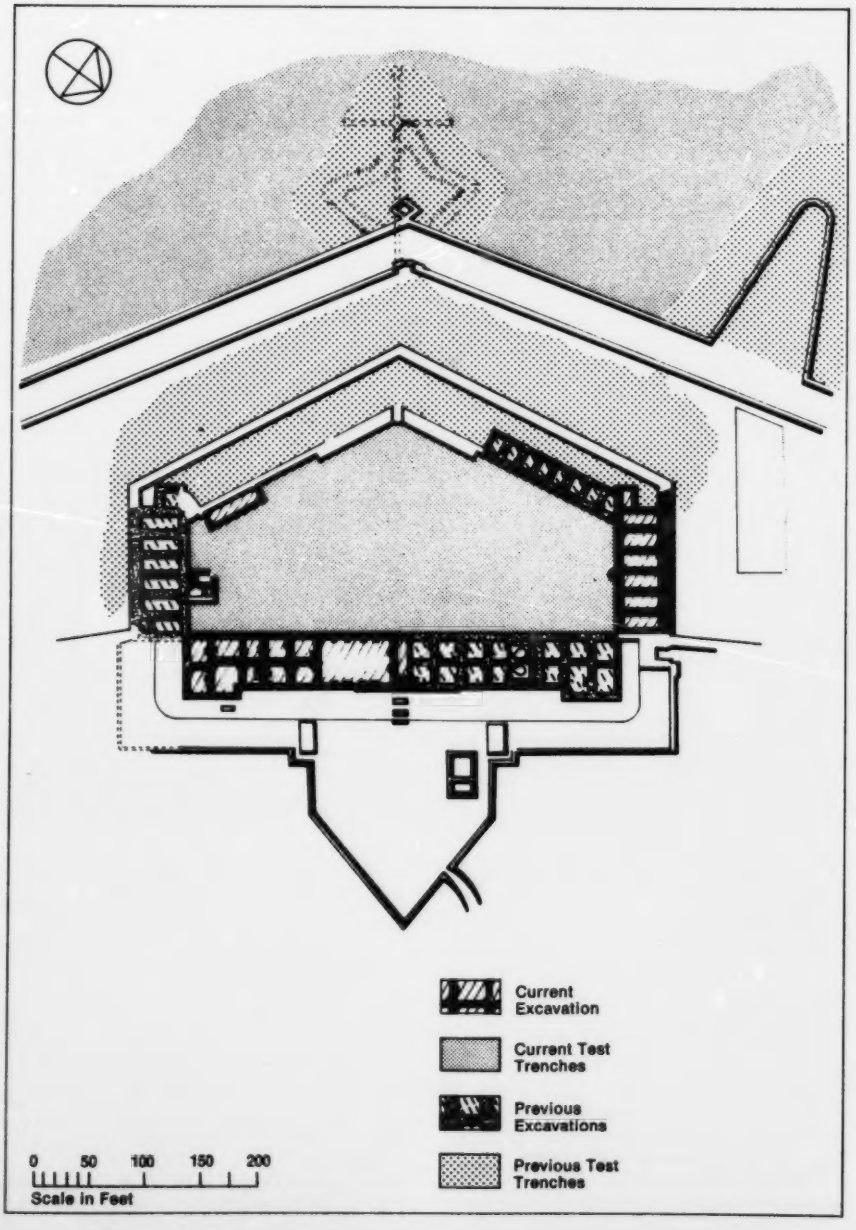
engineers in 1760. The location of charges in Casemates 5 and 7 Left was still clearly visible upon the walls of those casemates when they were excavated as part of the left flank casemate excavation. Further evidence showed in the destruction of the escarp in this area. Finally, this excavation provided tightly dated earth fill. Unfortunately, there were not very many artifacts in this fill and, since this was redeposited material, the artifacts found need not have been broken or lost at the time of the construction of the earth revetment.

Summer, 1964

The field staff continued with Larrabee, Walker, Fry and MacLeod. John P. Marwitt, Joseph O. Vogel, and Richard B. Lane joined it at the beginning of the summer as Staff Archaeologists. This gave an organization in which there was one Senior Archaeologist, the Conservator immediately under him in the laboratory, six Staff Archaeologists, and the Archaeologist-Illustrator. The staff archaeologists were to operate in such a way that there were three or four of them in the field at one time. This reduced the conflict of all reports being at the same stages of production during the winter months, made for maximum speed of report completion, and allowed the labour crew of approximately 30 men to be used effectively. The number of site assistants was again ten.

During the summer of 1964, the excavation concentrated on completing the work in the bastion and working on the perimeter or circumference around the outside of the bastion (Fig. 13). Vogel excavated the Chapel (Vogel 1965), which was the remaining portion of the Chateau, and Lane excavated the terreplein of the bastion (Lane 1966). Marwitt excavated the glacis of the outerworks and Fry did clean-up work on the interior revetments of the faces in the late spring (Fry 1964a) followed by a rescue excavation of a musket loop at the Princess Demi-bastion which was about to collapse into the ocean (Fry 1964b).

Near the end of the summer, Fry started work, under a shelter, on a house structure



in Block 16. This structure was selected for excavation in the town because there was no feasible wet-weather work or covered area remaining in the bastion in which to keep men profitably employed in the fall and spring. Block 16 had been chosen as the one area in which the most information was readily available to guide excavation and where the least harm could be done by starting before full historical information was available.

Work continued in the laboratory under Dunton and on illustration under Akerman, who had several seasonal assistants. A labour force ranging from four to seven worked in the laboratory.

The Chapel

The Chapel was part of the Chateau, about 63 ft. long and 40 ft. wide, with four buttresses creating five bays on each side. The altar was at the south end, towards the officers' quarters, and the main entrance was opposite it, opening from the central passage through the Chateau. The French left most of the Chapel area unexcavated except for wall trenches around the periphery and foundations at the north end. They made excavations under the floor for burials as necessary.

Because it was known that there was at least one burial here (exposed and replaced during the 1930s), and that there might be others, intensive preparatory tests were made in this area. Elizabeth K. Ralph, Associate Director, Applied Science Center for Archaeology, University of Pennsylvania Museum, Philadelphia, surveyed the area with a proton magnetometer, resistivity meter, seismic surveyor and a metal detector. These tests were not conclusive as to the location of any of the burials found by later excavation. This is probably because the disturbance of each burial resulted only in slight mixing of the soil. The French had already removed the A and most of the B horizon in this area, so that their burial pits contained only mixed C material, which recompacted to approximately the same density. Bedrock was only from two to five feet below the surface. It is also possible that nails and the effect of fire on wooden beams or the earth floor may have affected the instruments' sensitivity.

Excavations found a pattern of regularly spaced beams which had supported a floor for the Chapel. It is possible that this was not the original floor of the 1720s. It seemed that the altar area was raised, but because of the damage to the Chapel during the second siege, when this portion of the Chateau had burned, there was not much evidence remaining. What information there might have been was largely lost during the 1930s. Consequently, all that was left was the general outline of the major supporting beams. This clean-up had also removed almost all artifacts from this area, so that the excavation shed relatively little light on the original fittings and details of this area where ornamental work could be expected. It is likely that the windows were of clear glass, as none of the fragments found was coloured.

The most interesting finds in the Chapel were the five burials. Four of these were adult and one was a child, perhaps two to three years old. The pins of the winding sheet were the only artifacts associated with this, or any of the burials, except for coffins and coffin nails. Three of the adults and the child were buried in the body of the Chapel, two on each side, and the remaining adult at the centre directly in front of the altar. This last was the burial which had been disturbed in the 1930s and redeposited, enclosed in concrete slabs. Two of the other adults had been buried in wooden coffins which had almost entirely disappeared, and one adult was in a lead casket which was well preserved. This had once been inside a wooden box which had since disappeared (Fig. 14).

James E. Anderson, at that time at the State University of New York at Buffalo, and now of the University of Toronto, came to the site in order to assist in the final excavation and to reconstruct the material for study (Anderson 1964). The major objective was the identification of the individuals so that the sites could be marked after reburial. With the exception of the skeleton in the lead casket, restoration was necessary on all the skulls before measurements could be made, especially as autopsies had been performed on two of the individuals. The cutting of the skull caps had greatly weakened the facial bones which had then collapsed completely or warped as the coffins decayed. All the adult burials were male and within a range of middle age. Sex of the child could not be determined. The burials dated from before the destruction of the Chapel as shown by the superposition of the floor beams over all of them.

The individuals known to have been buried here were Governor Forant (1740), Governor DuQuesnel (1744), the Duc d'Anville (secondary interment in 1749; he had first been buried near Halifax in 1745), and Michel de Gannes, the King's Lieutenant (1742). Until complete biographical information is available it will not be possible to make certain the identification of the bodies. However, the burial in front of the altar, reinterred in the 1930s, is almost certainly that of the Duc d'Anville, as shown by location, age, medical care (fillings in the teeth for example) and autopsy. The nearest burial on the left side facing the altar is almost certainly that of Governor DuQuesnel, who had one leg missing and also had an autopsy. The two adults buried on the right side, then, are probably Governor Forant and Michel de Gannes, but it is not possible at this stage to say which is which. Apparently all burials were made in winding sheets, as there was no evidence of clothing.

The Terreplein

This area was excavated by a series of long trenches. They were located to find the slopes of the surfaces but were also affected by some construction activity. The forward centre portion of the terreplein, near the flanked angle, had been completely removed by bulldozing or covered by ramp construction during the early phases of the project, so that it was not possible to determine slopes there; how-

14 The lead casket, containing one of the five burials, was carefully cleaned before it was opened. The intrusive pit in which it was placed is barely visible in the balk of earth still covering the foot of the casket.

ever, this was a high area from which drainage flowed, so that the slopes could be projected. Excavation took place under particularly difficult conditions due to the miserable weather (Fig. 15).

There was an organically rich, artifact-bearing stratum of varying thickness which was the occupation layer during the mid-18th century. This was deposited in some places on bare subsoil of which the upper layers had been removed by the French to bring the terreplein to the desired level. Where fill had been placed there were sometimes early and temporary occupation levels below it. This main occupation layer may have increased a slight amount during the 18th century use of the site by accumulation, but it is probable that the major portion of its thickness simply represents the depth of a zone which was disturbed by constant traffic during the wet weather. Thus, there is no simple equation, such as saying that the bottom of the zone represents the beginning levels of the terreplein and the top of it the final.

There were complex slopes involved in the terreplein. The function or effect of these was drainage of this enclosed area, but finding out what the slope had been, and how, if at all, the drainage had worked, was a very difficult problem of research made even more difficult by subsequent 19th- and 20th-century deformation of the terreplein. This happened due to consolidation of sediments (i.e., the construction fill below the occupation layers), by weather, ground water, and by heavy recent traffic and use starting in the summer of 1962. First of all, there were considerations of what the specific soil or stratigraphic evidence showed regarding surfaces, and whether these had been deformed after the French occupation. Secondly, there were theoretical questions which could only be resolved when the entire area had been investigated, regarding whether the surfaces and slopes found would have drained, and if so, how they would have drained. The hyraulic topography here is probably, but not necessarily, a controlling external determinant which could be tested against the levels found by excavation. The third consideration was whether such a surface, if re-exposed or reconstructed, would drain now. This involved comparing the apparent drainage pattern with the structural indications of possible water outlets which surround the terreplein. There was over 5 ft. difference in elevation from about 38 ft. above sea level near the left shoulder to a low of nearly 32 ft. near the right shoulder.

Some features in the terreplein were in a fenced enclosure in the southern quarter. This held livestock and possibly some garden plots for the Governor's use. Within this fenced enclosure was a small building against the left flank casemates (3S), excavated separately, and discussed under the 1965 season, and a long thin building 14 ft. wide and about 52 ft. long (3Q) which was against the interior revetment of the left face. Its use is not known.

Next to the right flank interior revetment was a well between Casemates 3 and 4, and against the right face interior revetment, near the shoulder, were several posts from a wooden platform which had been constructed during the 1745-49 New England and British occupation. These posts helped to provide a control on the finer divisions

15 After a light snowfall on 19 November 1964, the backhoe in the foreground has just cut the first two of several long trenches in the terreplein. Previous trenches were hand-excavated, for control. Three of these can be seen to the left, near the shelters covering the Chateau. A row of test pits is next to the nearest hand-dug trench. The small plastic shelter permitted recording of the stratigraphy in one pit after another in such weather.

of the stratigraphy in that part of the terreplein. There was an extensive cobbled walk or drain preserved near the right flank, and parts of a cobbled walk along the Chateau.

Interior Revetment of the Two Faces
The interior revetments were vertical walls on the right and left faces of the inside of the bastion. They did not meet at the flanked angle because this area was covered by the joining wall of the two ramps, and the remains of this whole area were not sufficient to determine wall height. Other main features of interest in the interior revetments were the remains of sealed or blocked doorways to the temporary powder magazine in Casemates 11 and 12 Right, and the openings to Casemates 8 and 9 Right. At the left shoulder was the opening to the curved *corne de vache* passage which led into Casemate 7 Left. Building 3Q was built as a lean-to against part of this left face interior revetment.

Musket-loop at the Princess Demi-bastion
This musket-loop was one of a row which had once existed on the seaward flank of the Princess Demi-bastion. It had been designed to provide fire cover along the beach; not so much to prevent a landing at that point, as reefs and the surf made this unlikely and there was crossfire from artillery, as to prevent a force from working its way along the beach or in small boats and around the end of the fortress.

It was good luck that the musket-loops were preserved until the spring of 1964. The row of musket-loops had been abandoned and plugged, and a wall built inside the passage against the musket-loops. Later the passage was filled with earth. Earth was placed against the outside of the wall as a revetment. The filling of the loops could be roughly dated by pieces of ca.

16 An official party visited the excavation of the musket-loop at the Princess Demi-bastion during the summer of 1964. The stories have been numbered, prior to removal. The masonry blocking of the round part of the loop can be seen.

1745-50 British Staffordshire pottery in the construction debris under the layered fill. This coincides with a recently found historical reference to the blocking of the passage by the British between 1745 and 1749, providing excellent confirmation of the artifact dates.

The other musket-loops in this row appear to have been destroyed in the demolition of 1760, or to have suffered from subsequent surf action and erosion of the earth fill from above. This one, nearest the flanked angle or salient of the demi-bastion, had escaped the effects of the blasts behind it, and the earth cover had been added to by earth falling from the top of the bastion. Thus it had remained protected until the spring storms of 1964.

As soon as it was discovered, shoring was hastily placed to hold it for the few weeks until the weather would permit a quick salvage operation. The best example of French cut-stone masonry found intact anywhere in the Fortress, it served as an important example. The upper course of stone had been displaced slightly forward, but the rest were undisturbed. In shape, it was like an inverted keyhole. The height of the cut-stone masonry was about 5 ft. and the slot itself about 4 ft. (Fig. 16).

House in Block 16

According to historical evidence, this was the second structure built on the northeast corner property of the block, after subdivision in 1731, adjacent and to the south of the first, which was built in the early 1720s. We uncovered masonry foundations for a wooden superstructure measuring about 53 ft. by 25 ft. in external dimensions. There was no cellar, and the floors could not have been more than a foot or two above the earth underneath them. There was a drainage channel running across the south end from west to east under the floor, and a back-to-back double fireplace base

near the centre of the building. The back yard of the building had various structures. The building was certainly damaged in one of the sieges. Many thousands of artifacts were found, most of them in the yard rather than inside the building, as would be expected.

This is the only evidence of civil residence excavated during the period covered by this article. These artifacts were extremely valuable, not only for their wealth of detail and relatively good condition, but because an area in the civil town such as this had not suffered the same continuous alteration, disturbance, reconstruction and renovation as the military and government areas of the citadel. Although the Chateau was occupied by a large number of people, the data obtained were relatively incomplete. This was accentuated by the reconstruction in the 20th century. Despite all the excavation in the citadel area, we found that the material in the only house and yard excavated in the town before 1966 provided a preponderance of the archaeological evidence for the way of life of the Louisbourg inhabitants.

Fall, Winter, Spring, 1964-65

The staff remained the same with the addition of Jervis D. Swannack, Jr., as Supervising Archaeologist. This position was on a level with that of the Conservator and came immediately under the Senior Archaeologist.

During the fall, excavation continued on the terreplein of the King's Bastion. The burials were replaced in the Chapel and it was back-filled with the same earth which had come from it. This was the first phase in the restoration of the Chateau to its previous condition. The interior of the postern tunnel was excavated by Vogel in the fall (Vogel 1966a).

With the ending of Lane's terreplein work in December, excavation which had lasted for approximately 33 months since the spring of 1962 was stopped. This continuous excavation had placed considerable strain on the laboratory, on project photographic services, and on the mapping facilities of the architectural draftsmen of the project. It had also drawn enough energy and attention to interfere with the production of reports. However, work which was very similar to excavation continued through the winter: cuts were made in the walls of the south half of the Chateau; the right flank escarp of the bastion was dismantled; and pits were dug to find the counterforts of the north half of the Chateau. Although this work involved men and time, there was no major excavation. Fry, Walker and MacLeod were involved in this continuing work. Lane was detached on loan for a month to the Halifax Citadel. There were three site assistants during most of this winter, and the archaeological labour supervisor, T. Marmon Smith, acted as additional site assistant. During the wet spring season, the crew was employed on the house in Block 16. The excavation of the house was nearly finished when the summer began.

In the laboratory, Dunton was joined by Renée Hine Marwitt as artifact research assistant, who gave much-needed help in the study of artifacts. During this time, a foreman in the laboratory, Velma McComber, was added to the staff as an assistant technician. Akerman had assistants for part of the winter for drafting and illustration, and during the spring he wrote a report on the left flank casemates (Akerman 1965). During the winter, cut stones found in excavations were arranged in a shed constructed for them and work began on their cataloguing and analysis.

The Postern

This was a sloping tunnel about 50 ft. long, $4^1/_2$ ft. wide and about 6 ft. high, with two right angle bends in it. The vaulted roof was made of flat stone, set on edge. It led from the left flank of the townward defences covered way near the north end of the Chateau out to the main ditch by the right re-entrant angle of the King's Bastion. The two ends or entrances had cut-stone surrounds, and there was a vent with a cut-stone surround and wooden lintel opening into the Chateau ditch.

The tunnel itself, and the masonry which comprised it, constituted a very complex shape. Three major units of the fortification met here – the right flank, the Dauphin curtain, and the left flank of the townward covered way. It was bounded by the Chateau ditch, the main ditch, and by the space behind the curtain. Since this end of the bastion flank had originally been constructed as a free-standing structure, and the postern masonry later was placed against the terminating wall of the bastion flank, the sequence of construction was particularly complex and difficult to determine.

The tunnel was intact except for the ends which had been damaged by the 1760 demolitions at which time it was probably sealed. It was not particularly rich in artifacts, but those found, and the stratigraphy of the postern fill, indicated three apparent building stages which correlate with historical evidence. Dates calculated from the bore diameters of kaolin tobacco pipes were especially useful. In 1719 and 1720, the French started the major excavation which produced the main and Chateau ditches, and the surface upon which the right flank was constructed in those places where the casemates went below the original ground level. This excavated surface in the vicinity of the right re-entrant area remained open and allowed passage between the main ditch and the interior of the work, where the townward fortifications were to be built. In 1736, the walls of the postern were erected and several layers of fill, amounting to about a foot and a half, were laid along the base of this construction. The tunnel was left uncovered until 1739, when additional fill forming the graded floor was laid. This floor slope compensated for the difference in elevation between the curtain entrance at the main ditch and the covered way of the then newly constructed townward fortifications.

The masonry sequence here produced valuable evidence concerning the pre-1745 right flank escarp, since a portion of that original escarp had been buried in the masonry of the construction for this postern tunnel. Most other evidence had been

17 Fortress of Louisbourg: the citadel, fall, 1965.

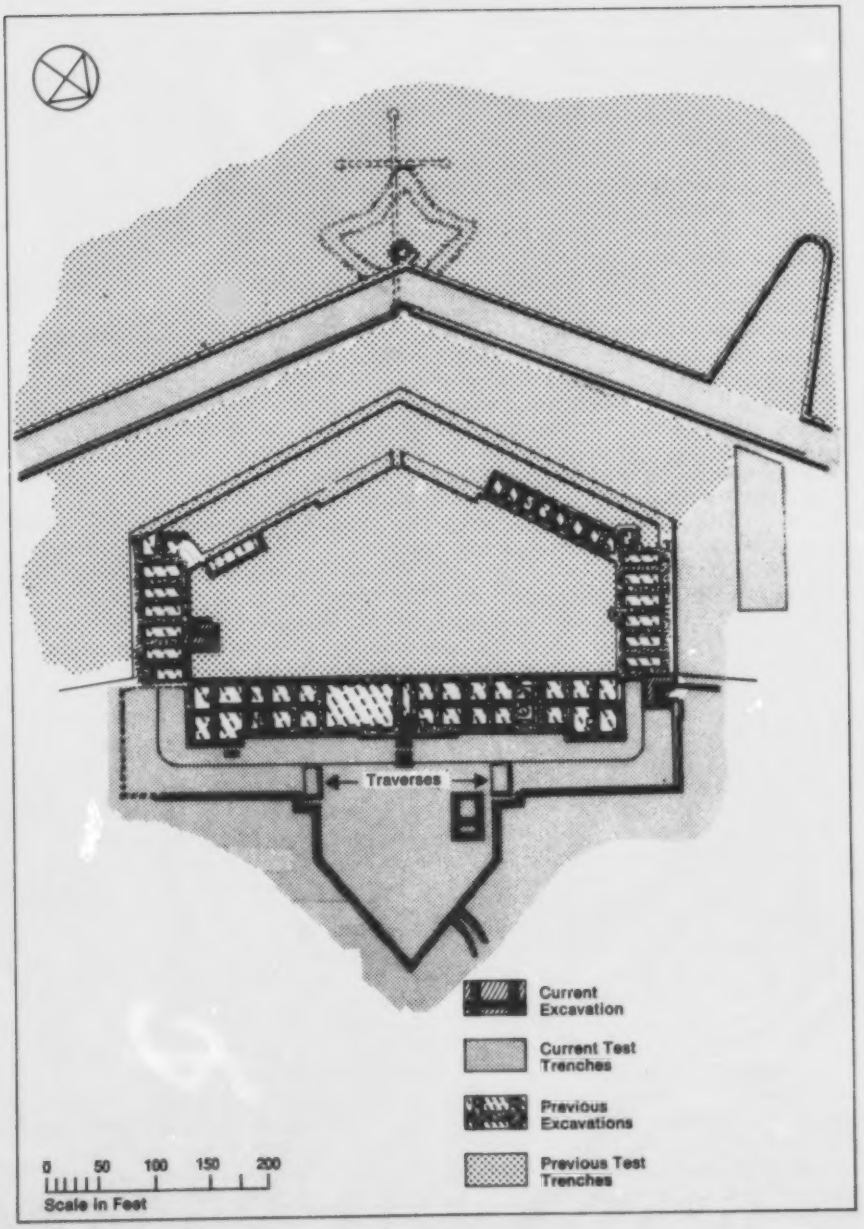
destroyed when the first escarp was completely reconstructed by the French.

Summer, 1965

The staff remained the same except that MacLeod left for a National Historic Sites Service excavation in Newfoundland and Robert Grenier was hired as seasonal Staff Archaeologist. Work this summer was spent on finishing work previously begun and completing the perimeter of the Citadel outside the bastion (Fig. 17). Swannack was Field Director during the summer excavation. Walker excavated the so-called *demi-caponnière*, or revetted glacis, off the right shoulder in the ditch (Walker 1966a). Fry completed his work on the house under the Block 16 shelter and then finished the major task of removing and studying the right flank escarp and the right re-entrant area where the postern tunnel opened into the ditch (Fry 1966). J. P. Marwitt continued his work on the outer works in front, excavating more than a thousand linear feet of counterscarp of the main ditch and revetment of the covered way, and studying the countermine gallery under the outer works (J. P. Marwitt 1966). Vogel (1966b) excavated the townside place d'armes and related fortifications and cleared the Chateau ditch and the counterscarp, which completed the periphery of the citadel. Grenier did intensive excavation of the hitherto unexplored building 3S within the terreplein of the King's Bastion. Lane sectioned the curtain wall towards the Dauphin Demi-bastion immediately beyond the area where Vogel, Fry and Walker had worked in the ditch off the right flank and at the right re-entrant angle (*see* Figs. 5, 18, 19, 20, 21).

Revetted Glacis

This was a mass of stone covered with earth in the main ditch off the right shoulder of the King's Bastion. The side facing the King's Bastion was a single thickness of dry-laid masonry about 140 ft. long. The length of the toe of the slope, facing the Dauphin Demi-bastion, was only 124 ft., as the west end of this structure tapered towards the front. It was about 40 ft. from



front to back and a distance of only 10 ft. away from the counterscarp.

There was no evidence of a firing step, so that it could not have served very well the purpose of permitting infantry fire over the pond in the ditch towards the Dauphin, and hence was not a true *demi-caponnière*, although often called such. It was built to deflect or absorb fire coming from beyond the Dauphin towards the right shoulder of the King's Bastion, an area which suffered very heavily during the first siege. This work was built shortly before the second siege to correct this basic defect in the defences. During the second siege, additional defence work was done here. Evidence of this was found in the form of barrels filled with earth placed in the narrow 10 ft. gap between this work and the counterscarp.

It is possible that rubble stone was used as the core of this structure in order to conserve earth, which was in short supply. It was necessary to conserve what earth was available to make an absorbent surface. The dry-laid wall had a slope of approximately 4:1 or 5:1 and was probably over 3 ft. high originally, with a foot or so of earth on top of it. This would have provided adequate shelter for men going to the outer works.

Right Flank Escarp

The right flank escarp, built by the French in the 1720s, had been very badly damaged in the first siege. They took down the remains and constructed a new one in 1755 before the second siege, trying a new technique to solve construction problems faced at Louisbourg. This second wall was well preserved and provided a very interesting example of the use of heavy timber in masonry construction, reminiscent of a *murus Gallicus*. Heavy horizontal and vertical timbers had been fastened together in the wall at regular intervals, with a plank facing, probably with a clapboard or lap effect, sheathing the surface of the wall. This allowed the mortar to cure properly, preventing collapse during the first season or two by leaching of uncured mortar from the surface. It also served to give the wall greater longevity in general by allowing the wood to weather rather than the masonry (Fig. 22).

This later wall was of the same length and one foot thinner than the left flank escarp, and had the same steep slope (approximately 8:1) as that found on the left. However, the evidence here was not necessarily pertinent to the pre-1745 wall. There was some evidence of the original at the foundation of the wall, but as noted above, the main portion of the wall left *in situ* was a column of cut stone quoins and a stub of the rough masonry buried and preserved by the construction of the postern tunnel where the curtain wall from the Dauphin Demi-bastion joined this flank of the King's Bastion.

Parts of the column of cut stones appeared to have shifted, so that a different batter or slope could be measured at different places. What evidence there was from apparently unmoved quoins, combined with the greater thickness of the pre-1745 wall at the base, suggested a slope of between 6:1 and 7:1. Additional evidence of this was the discovery of a set of quoins carefully cut to 6:1 on one face and 12:1 on the other face (the latter the approximate slope or batter of the remaining right flank terminating wall). These stones are oriented so that they could only have been intended for the juncture of escarp and terminating walls on the right flank. Unfortunately all were found re-used as construction blocks in the 1755 escarp, so the evidence is indirect. This is especially so since the batter of a wall can only be measured from stones *in situ*. Stones found out of context can be placed in such a way as to give a different slope from that to which they are cut. In any event, a specific wall batter was certainly not adhered to with geometric precision by the French.

The reconstruction of this wall by the French provided a very interesting effect in relation to the deep fill of the casemates behind it. The known dates of some of their work provided dating controls for the artifacts found in the earth fill, and as a result gave dating evidence for construction elsewhere in the Fortress.

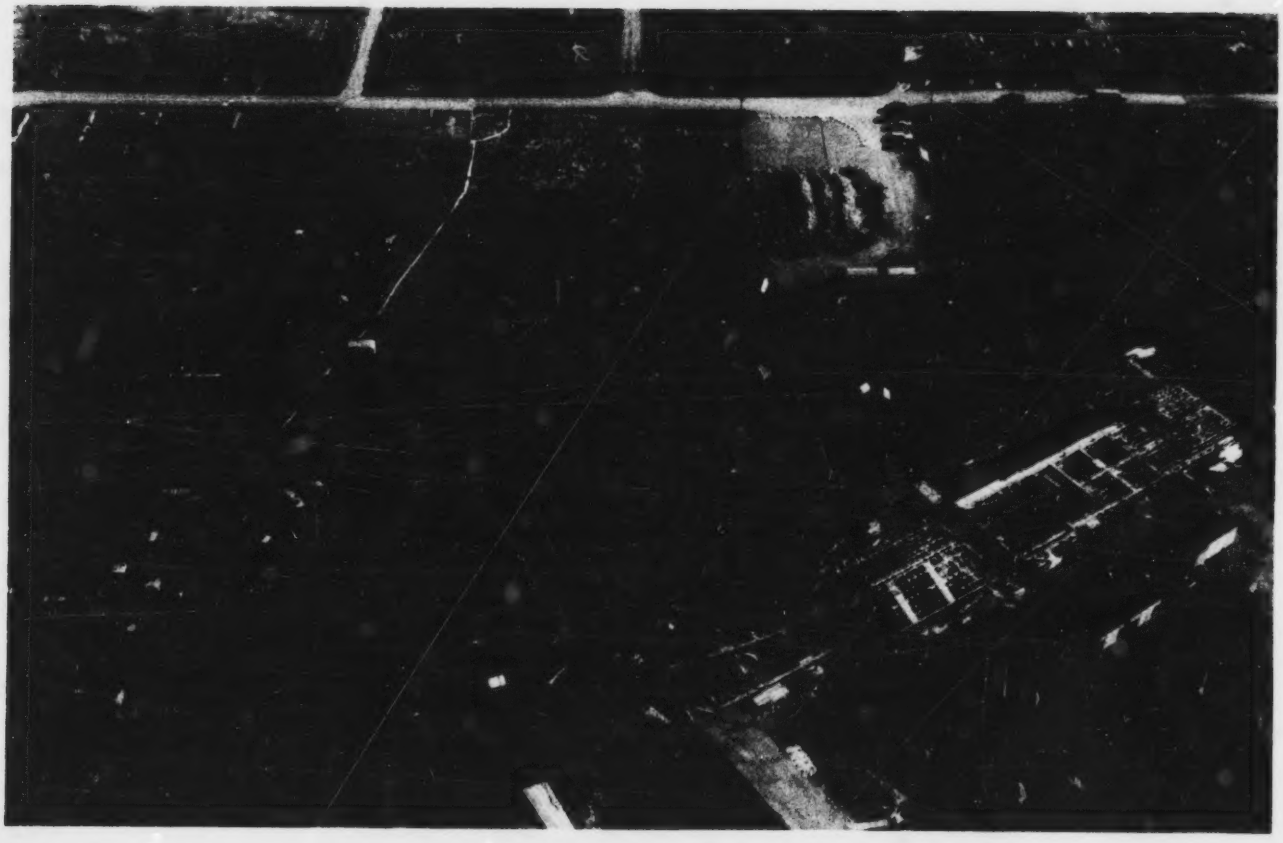
Outer Works

In 18th-century fortification, every surface and angle is affected by other surfaces and angles. The Fortress of Louisbourg was a double-crowned work facing the marshes. This meant that there were three fronts of fortification; the flanked angle of the Dauphin Demi-bastion to the flanked angle of the King's; the King's Bastion to the Queen's Bastion; and the flanked angle of the Queen's Bastion to the flanked angle of the Princess Demi-bastion. The angle of these fronts with relation to each other was determined by the necessity of providing enfilade fire from each bastion to the bastion on the other side of it. On a smaller scale, within each front or with reference to the immediate surroundings of a given bastion, the requirements were that the bastion should command the outer works and that there should be no "dead areas" in which an advancing enemy could shelter from fire.

The rules for constructing fortifications in the 18th century are usually stated in terms of an idealized or regular fortress, with the notation that for an irregular fortress the engineer must make modifications to suit the situation. Louisbourg was an irregular fortress by virtue of the uneven surface of the promontory on which it was built, by its exposure at two ends of the line to the ocean and the harbour, and by the command of the line of fortifications by certain hills in front and higher hills to the right.

For these reasons it was mandatory, even when trying to understand as limited an area as the citadel, to study the surfaces and angles around it. In this case the missing portions of the citadel complex, particularly the upper elevations and surfaces, could only be postulated with any likelihood of accuracy by studying the surrounding lower slopes. Hence the analysis of the outer works was particularly significant in attempting to understand and make it possible to reconstruct the citadel on paper.

18a This aerial view was taken in the fall of 1965, looking east, showing areas excavated that year and reconstruction. The curved entry of the town-side place d'armes is in the centre.



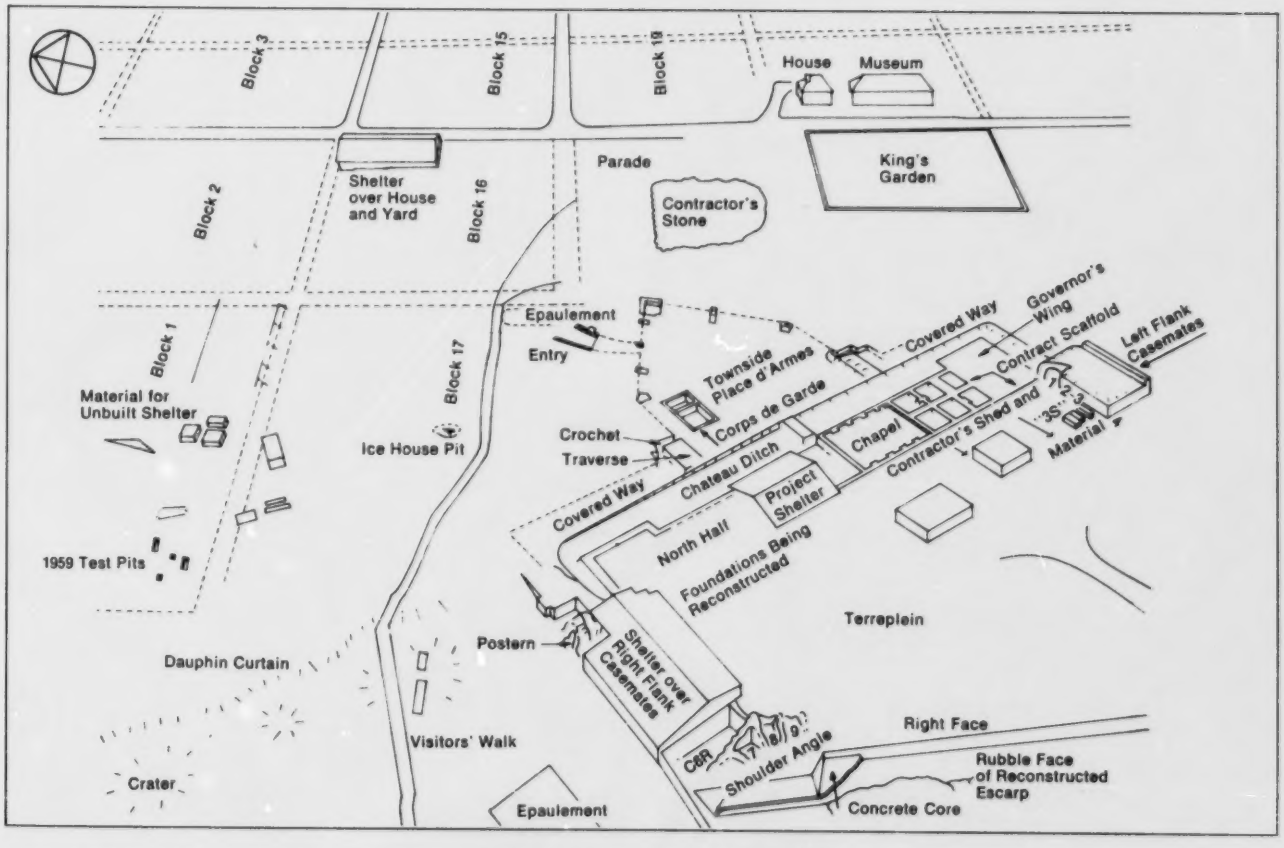
Counterscarp

Approximately 600 ft. of wall surface was cleaned on the outer side of the main ditch, facing the escarps of the two main faces of the bastion. This wall was standing from 3 to 7 ft. high above its base, which must have been nearly the original height in places. It was well-preserved, although usually standing higher at the back than on its face or surface which had been in the ditch. Common to most other walls of the fortifications examined at Louisbourg, there was a rough or irregular coursing about every 1.5 to 2.5 ft. in height. This rough coursing generally followed the contour of the underlying foundation of the counterscarp which rested on outcrops of bedrock or on the hard C-horizon material, a sandy loam packed with many rock fragments.

Revetment of the Covered Way

This was better preserved than the counterscarp. The mortar was still solid, and the wall was less displaced due to earth pressure. There was enough wall left in some places to determine the level of the banquette tread. In most places it was possible to find the approximate level of the covered way itself, and to postulate the width of the banquette tread and slope combined. The revetment of the covered way was a stone wall which did not reach to the top of the glacis slope. As with most walls which were designed so that men could shoot over them or take shelter from fire immediately behind them, the top 12 to 24 in. of the actual height of shelter would have been provided by a turf or sod-block revetted mass of earth. This prevented a splintering or shrapnel effect, should solid cannon shot penetrate through the very crest of the wall where the mass of protecting earth was the thinnest. It also absorbed musket fire and shrapnel, thus preventing ricochet. Apparently there was a palisade along this

18b Oblique-angled plan of area of Fortress shown in Figure 18a.



revetment, as two posts were found, as well as a trench from which others had been removed.

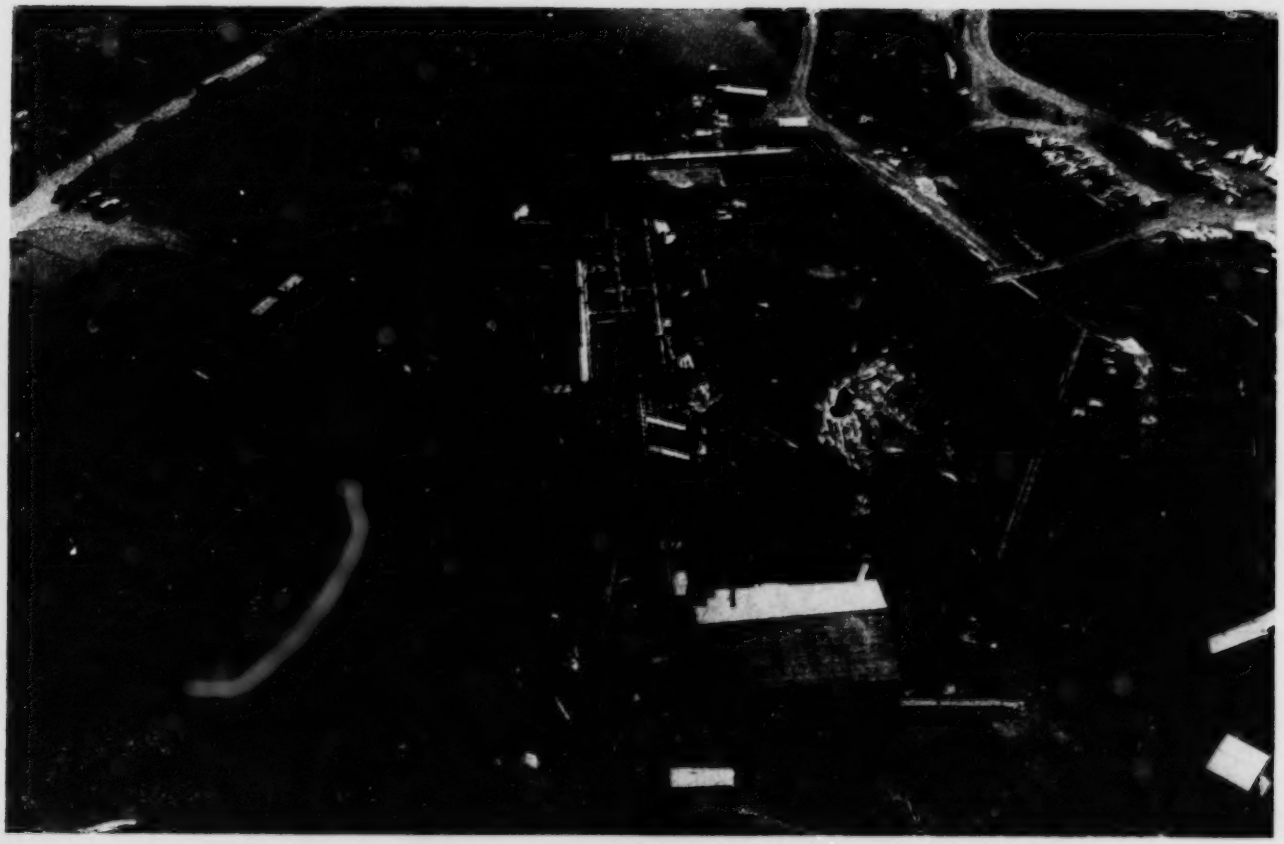
Glacis

The glacis provided good stratigraphic evidence of the extreme soil shortage during the French period. After the revetment of the covered way had been built, a small amount of earth with a very steep slope was thrown against it. This would have been useless against artillery, but it served to protect the wall from the weather and served as a minimum shelter until more earth could be provided. Later, filling was carried out in several phases, with the lines of the strata showing how the fill had been placed. Even at the final stages of construction there was insufficient earth to provide adequate covering for the King's Bastion. The thickness at the top of the glacis was more on the order of 10 to 12 in., as determined by glacis surface projections and probable breast-height from the banquette, rather than an ideal thickness of 12 to 24 in. (*see Revetment of the Covered Way*, above). Because of these complex strata and slopes, in which there were several surfaces existing at different times at different locations, it was difficult to determine which surfaces of the glacis were co-existent before the final topography. In an ideal fortification these exterior glacis slopes would be directly related to the height of the parapet of the bastion, and to the angle of the superior slope. On this irregular work, with insufficient earth, the exact relationship remains to be determined.

Right Re-entrant Place d'Armes

This area had been tested separately in the summer of 1963. Since then, the data produced were analyzed in relation to the data from the rest of the outer works, as the more comprehensive examination pro-

:9a Another low oblique aerial view, looking southeast, was also taken in October 1965. The Chapel of the Chateau is in the centre.



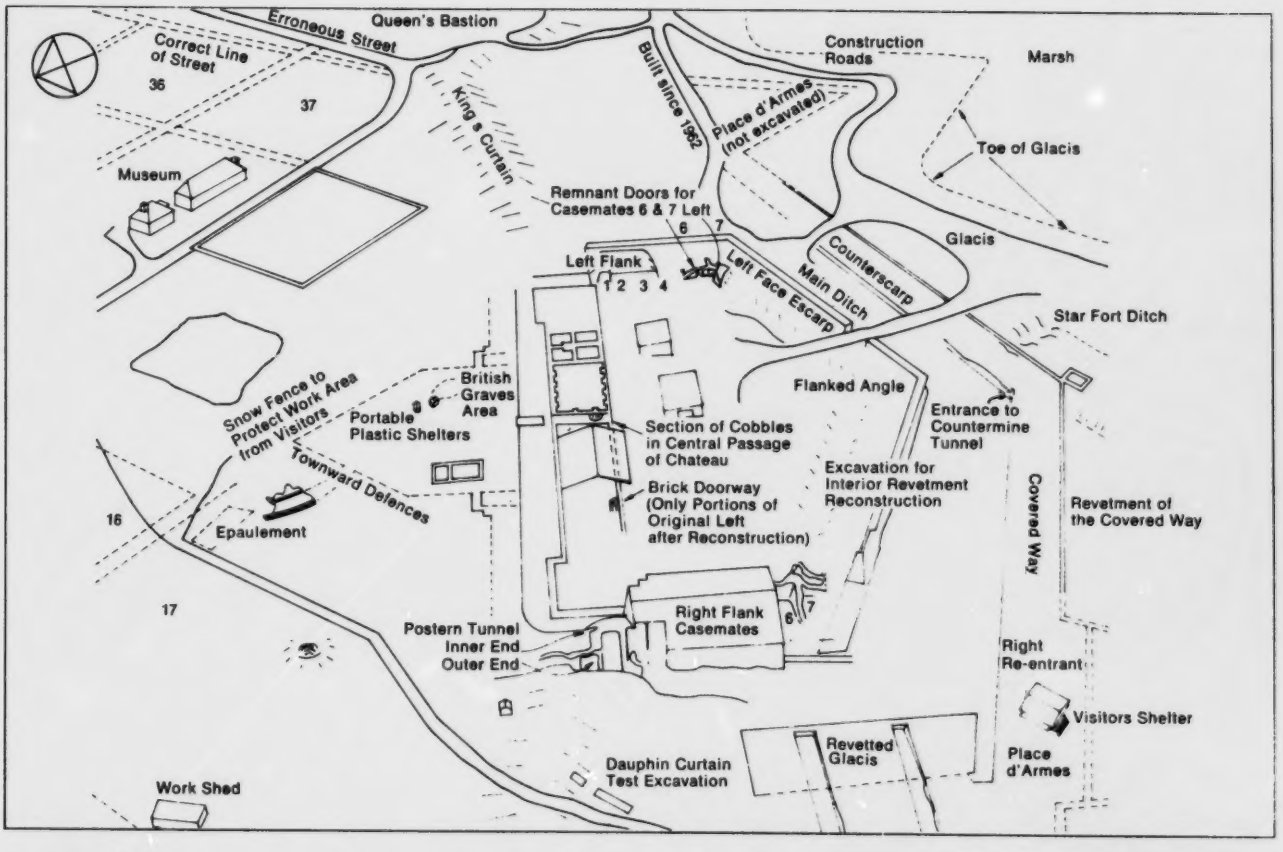
gressed (Fig. 23). The right re-entrant place d'armes was built after the outer works were started, to give enfilade of the area in front of the right face of the King's Bastion. This was a means of increasing the length of wall over which infantry could provide fire down the glacis. From its location it could as logically have been called the right shoulder place d'armes, but traditionally, and in the French documents, places d'armes in the outer works were supposed to be opposite a re-entrant area rather than a salient area. This one assumed its peculiar, long, narrow shape because the pond to its right prevented it from being at a normal location and of normal width.

Due to the slope of the hill on which it was built, this place d'armes was higher on the left side than on the right, and appears to have had a double banquette step on the left side. This is logical considering the short range of musket fire, as the works to the left of the place d'armes were higher than the pond to its right; however, the backs of the men firing over the left side were exposed to long range artillery fire coming from the northwest, beyond the Dauphin Demi-bastion. This is further proof of the irregularity of the whole fortress, and of the scarcity of adequate building materials. Fortifications like the Fortress of Louisbourg were best built where there were large amounts of earth available, but this condition did not exist on this shore of Cape Breton.

Countermine Tunnel

This gallery was built during the earliest phase of construction on the outer works. On a level surface in front of the King's Bastion a trench about 3 or 4 ft. deep was dug and lined with stone walls. A stone-arched vault joined the walls above the trench. The vault, which had sloping outer

19b Oblique-angled plan of area of Fortress shown in Figure 19a.



sides and a flat top, was covered with the earth with which the glacis slope was being built. It was thus built largely in the open and then buried to make it a tunnel.

This countermine gallery was cruciform, with a main gallery approximately 120 ft. long to the crossing, and three arms each about 40 ft. long with a mine chamber at the end. There was a series of beam holes, some with stubs of beams still in place, about halfway up the wall on each side, and pieces of wood had fallen out of these to the floor. These short sections of wood may have held fuse lines above the water but must have been used primarily to support a board form for the arch construction. Impressions of these boards still remain in the roof mortar.

The tunnel entrance, directly opposite the flanked angle of the bastion, was completely sealed by the causeway the British built after 1760. It is possible that the doorway may have been covered with fallen debris by the time the British occupied the fort in 1758 and that they were unaware of its existence. In any event, it was perfectly preserved except for the doorway itself. The mine chambers had not been charged when the tunnel was sealed.

At the entrance there was evidence of alteration in the plans for the main ditch, which was originally to have been narrower. This was indicated by a continuation of the tunnel wall foundations about 12 ft. towards the bastion into and below the floor of the ditch. There were cut-stone stairs on either side of the tunnel entrance leading to the counterscarp which provided access to the covered way of the outer works. The lower treads of these were well preserved when first uncovered. There was a cut-stone surround to the entrance of the gallery, and a short funnel-shaped section of brick vaulting just inside.

22 Here the camera is looking south in December 1963 along the length of the right flank escarp as exposed at that time. The spacing of the upright timbers in this 1755 wall is clearly visible, as is the pile of cut stones which had fallen to the foot of the wall. Shed roofs and canvas cover the open ends of the casemates above the height of the wall still standing.

23 A long trench is shown cutting across the right re-entrant place d'armes. The view is looking northwest, with the remains of the Dauphin Demi-bastion visible directly above the trench and beyond the line of outer work and the small pond, and some houses of west Louisbourg showing across the harbour.

General

In all of the outer work excavations, very few artifacts were found, as most of the earth fill had been brought from outside the fortress. Some of the fill was provided by levelling small hills immediately in front of the fortress which could have provided cover for the enemy. The few artifacts included a crowbar which may have been used by the British when they were demolishing this outer area. It has been indicated that this demolishing was done "by hand." This probably meant that the tops of the stone wall were pried loose so that erosion would break the walls down. Well-preserved indications of barrels were found in several places, with the iron hoops still supporting the earth casts of the shape. These barrels were probably filled with earth and used like gabions during the last siege. This would account for the preservation of their mould or shape. Elevation of the artifacts was important as evidence in determining the elevation of the covered way.

The Townward Defences

These were the defences (combined with the Chateau which closed the gorge of the bastion) which made the King's Bastion into a citadel, by making its defences face in all directions.

Townside Place d'Armes

This was the rallying ground or small parade immediately to the northeast of the Chateau. It faced the town, so that its directions of left and right are the opposite of those of the bastion, which faced the country. Because of the monumental entry, the Chateau also can be considered to face the town.

The only way to enter the King's Bastion was through a curved roadway which led into the place d'armes. An épaulement covered its open end. After coming up the slope and through the gateway, one would pass a guardhouse. This corps de garde was about 35 ft. by 20 ft. in exterior dimensions, and the foundations indicated two interior chambers. An intruder would pass the guard and cross the Chateau ditch on a bridge, the inner portion of which was drawn up each night or at any time that danger was thought to be present. After crossing the bridge, he would go through the central passage of the Chateau, where there was another guardroom facing the entrance to the chapel, and finally would emerge in the inner court or the terreplein of the bastion.

The terreplein of the place d'armes was used for burials in the British period. Two burials were uncovered during the test excavation, one in the remains of a brass-studded coffin, the wood of which had largely decayed. Gravestone fragments were found which may refer to other burials. There was a thick occupation layer on the terreplein. The place d'armes was built only a few years before the first siege, probably being finished about 1740. It was partly built over the site of such earlier structures as a temporary barracks and a government headquarters building, occupied during the construction of the citadel. Evidence of these underlying structures was found while uncovering wall foundations at the salient or flanked angle of the place d'armes and under the corps de garde.

The revetment walls around the place d'armes were well preserved, standing in most places to half or more of their original height. This would normally have been 4.5 to 5 ft. of wall, of which about 1.5 ft. would have been buried by the banquette, so that aout 3 ft. of wall were exposed. There would have been about 1 to 1.5 ft. of turf above that, so that a man standing on top of the banquette would be exposed from the shoulders up, and could fire over the top of the w[illegible]By stepping down from the banquette to the terreplein he would be completely sheltered from enemy fire.

In this particular case, it seems that the masonry walls were well preserved because earth was piled against them higher than usual, leaving very little, if any, of the masonry exposed. This was done after the construction of the masonry to hold the palisade in place. The palisade, of fairly small wooden posts, was flush against the stone wall. The posts were between 3 and 6 in. in diameter and about three-quarters of a foot apart (Fig. 24). To judge from historical references they probably projected over the top of the defence. This was more for visual effect than strength. The palisade could not have been very strong as the poles were not really dug into the earth of the banquette or terreplein below it, but were only held up by the earth piled against the stone wall. From outside it would have looked fairly menacing, as the poles would have undoubtedly been sharpened at the top, and it would have given additional cover to men firing. Because the town capitulated after heavy bombardment in both sieges there was no direct assault on any of the defences and the effectiveness of the palisades and revetments was not tested.

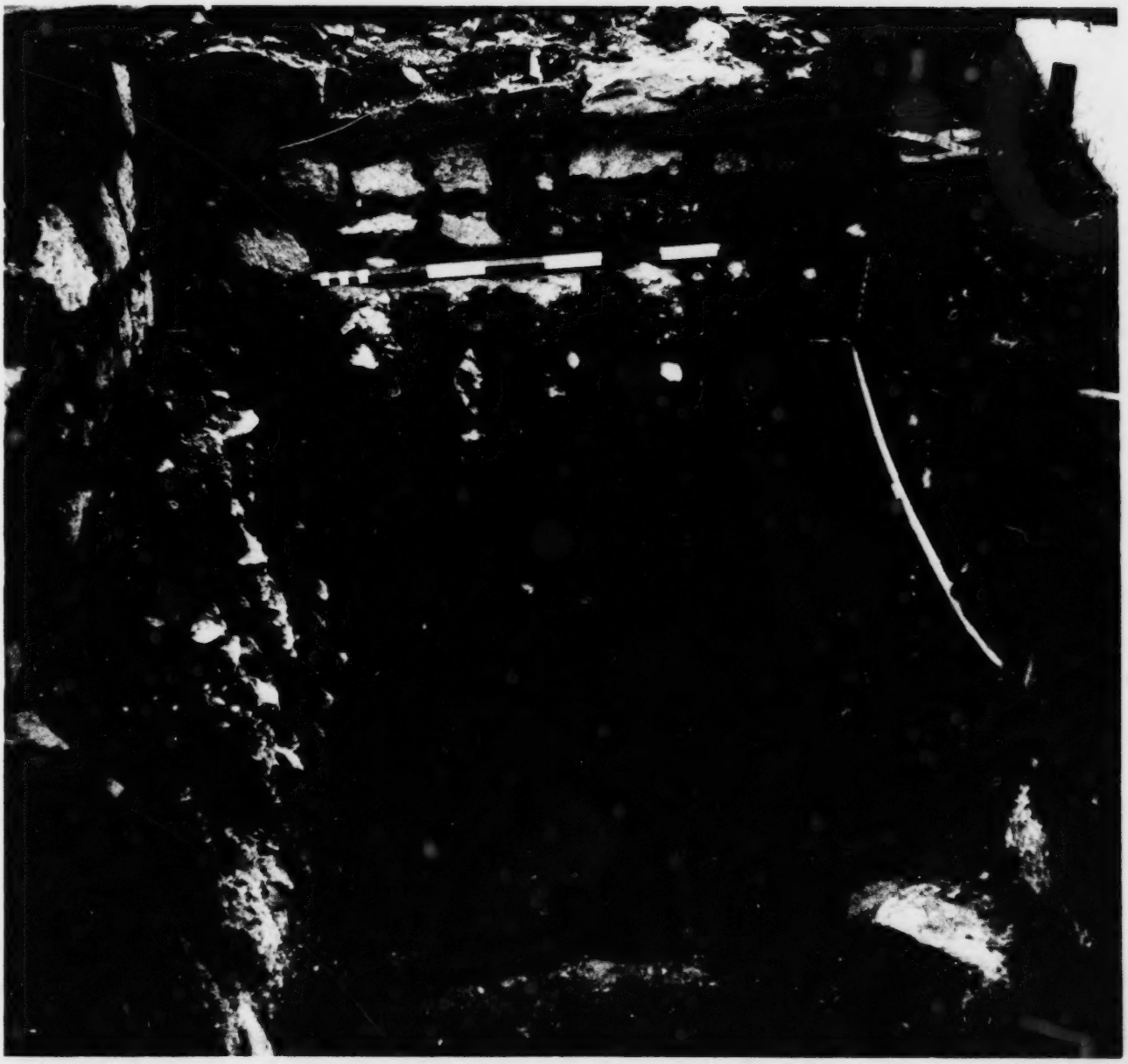
Other Parts of the Townward Defences

There was an extension of the covered way on both the left and the right flanks of the place d'armes. A zig-zag passage or crochet went around the traverse at each corner of the place d'armes to provide access to the covered way. These traverses shielded the central rallying place from any long, low shot which might just clear a wall.

The Chateau ditch was originally about 8 ft. deep and about 27 ft. wide, but narrower where the wings of the Chateau projected. It was drained by a channel running under the left flank of the covered way. This drain was lined with rock and covered with short lengths of timber. The ditch appears to slope from south down to north, which is similar to the slight slope in the Chateau itself. This ditch accumulated a great deal of refuse from the Chateau despite several clearings such as those providing fill for the right flank casemates. One burial was found here during our excavations near one that had been found in the 1930s. Also in the 1930s, two siege casualties were found beneath debris from the drawbridge.

In addition to the main bridge at the centre of the Chateau ditch, the English had built the foundations for another bridge

24 The casts, measuring up to 6 in. wide, made by palisade posts are cut in vertical section here at the left re-entrant angle of the townside place d'armes. The stone wall was found to continue below the foot of these holes. The earth had been piled against it to hold the palisade in place.



near the Governor's wing, when they occupied it after 1758. The only use made of the ditch as shown in French construction was the one door which opened from the wine cellar under the Governor's wing. It is not known how access was gained to the ditch to get to this door. At one time there was a latrine attached to the Governor's quarters which emptied into the ditch near the intersection of the Chateau and the left flank. The 1930s work obliterated evidence of this, but historical references indicate that it was abandoned and taken down because its proximity to the wine cellars affected the flavour of the wine.

General

The townside fortifications would appear to have been influenced by the slope of the pre-existing topography so that the highest point was by the counterscarp in the vicinity of the bridge. Thus the masonry work slopes downward from each of the crochets towards the shoulders of the covered way, and toward the salient angle of the place d'armes. These differences in elevation appear to have made areas of the interior of the fortification vulnerable to both frontal and enfilading fire and probably influenced the French engineer Franquet in his low opinion of the townside works as a defensive fortification.

Building 3S

This was a small irregular building attached to the front of Casemates 2 and 3 Left, and projecting into the terreplein of the bastion within the fenced area. It probably served as a stable or storage house within the Governor's yard. It was approximately 22 ft. by 25 ft. in outside dimensions, although one corner was cut back to allow entrance to Casemate 3 Left. There were three subdivisions or rooms indicated in the foundations. (*See* the photomosaic, Fig. 25). A brick floor seems to have covered the floor of two of the three rooms. There is good evidence that the long room (number 3) on the west was a later addition, and had no brick floor.

Despite disturbances by Kennelly, by private use after his restoration work, and again perhaps during the 1930s, many artifacts were obtained with good stratigraphical control, so that a detailed study of cross-mends was possible. A complicated series of ditches had been dug here during the above-mentioned intrusions, but the configuration of strata and their contents made possible tentative identification of the different periods of work, which the cross-mends confirmed. There were more ditches extending beyond the building toward the centre of the terreplein.

Dauphin Curtain

Indications are, from the excavations that were done next to the left flank, that the King's curtain probably resembled the Dauphin curtain which ran from the Dauphin Demi-bastion to the King's Bastion. The Dauphin curtain had a stone escarp between 11 and 12 ft. thick at the base to revet the front of the mass of earth, but only an earth slope on the back – insofar as has been examined. It appears that the main drainage of the Chateau ditch ran under the earthwork of the left flank of the covered way of the town defences. From there it ran in an open ditch along the toe of the slope at the back of the curtain.

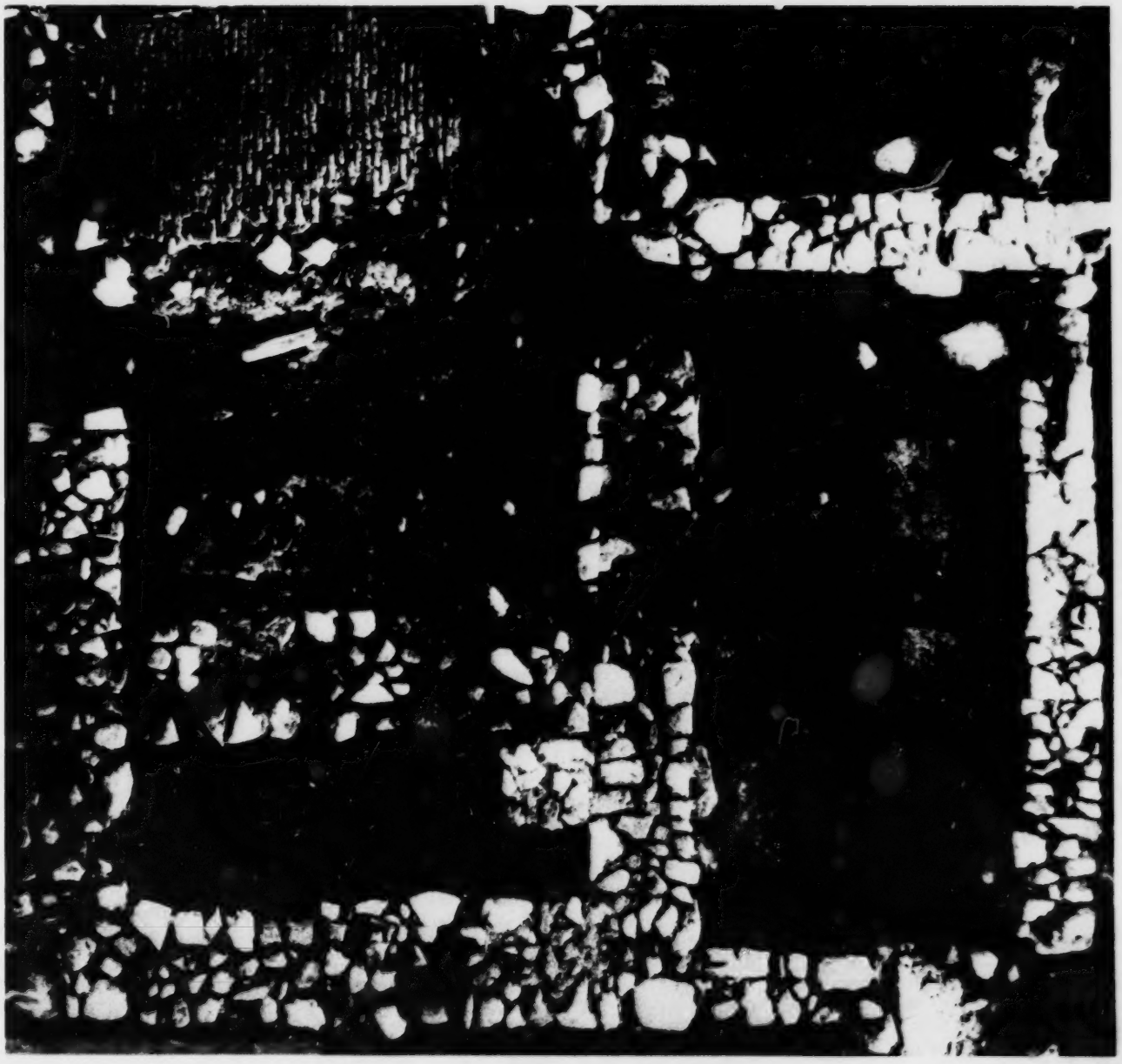
This curtain was a complex structure, lower at the Dauphin Demi-bastion end than at the King's Bastion end. French documents report that the Dauphin Demi-bastion was about 23 ft. lower than the King's Bastion at their flanked angles. Test excavations across this curtain up to 110 ft. away from the bastion have produced information on its construction, physical appearance, and the damage suffered in final demolition. Most important, these investigations have made it possible to project a line and contour of the escarp foundation from the right re-entrant corner by the postern. This answered questions made difficult to solve by the rebuilding of the right flank escarp after the first siege.

Fall, 1965

Work in the laboratory during the summer and fall proceeded to take the form of specific studies. Dunton studied faience and R. H. Marwitt studied coarse earthenware and table glass (Dunton and R. H. Marwitt 1965). This and Walker's work on pipes (Walker 1965a, b; 1966b, c, d; 1967b, c) were mentioned in the discussion of the right flank casemate excavations during the winter of 1963-64. Another assistant technician, Clarence Saulnier, was added to the laboratory staff. Akerman continued his work with his assistants during the summer. This illustration program served to provide professional quality illustrations for the reports of the staff and also to illustrate the artifact studies of the laboratory (Fig. 26). Type-series for ceramics, hardware and glass have been started to facilitate analysis of data for excavations (R. H. Marwitt 1965, 1966, 1967a, b). This was closely tied to the refurnishing of the Chateau, for which historical work had been underway for some time (Dunton and R. H. Marwitt 1965; Walker 1966c).

Besides the work by members of the laboratory staff, additional major areas of interest or studies were undertaken by the other members of the staff. Swannack (1966) studied paving stones as the beginning of a series of studies of such classes of artifacts with the immediate requirement of working out the pattern for covering the terreplein of the two flanks of the bastion (Fig. 27). Walker concentrated on kaolin tobacco pipes as a dating tool (Walker 1965a, b; 1966b, c, d, e; 1967b, c; also Omwake 1965), J. P. Marwitt on structural

25 This mosaic is made of many vertical photographs taken of the foundations of building 3S after they had been excavated in September 1965. The paved section of bricks on edge, against the left flank interior revetment, at the top of the picture, probably extended all the way to the outer end of the building, covering all of Rooms 1 and 2.



26 After a ceramic vessel has been processed by the laboratory, a measured drawing is made of it, if it is considered important in the study of basic wares found at Louisbourg.

iron, Lane on soils and stratigraphy, and Vogel on nails and bricks. Few of these studies have developed to a point where they are publishable, but all have shown their usefulness in the immediate and practical problems of reconstruction. Further contributions, to appear eventually, will show the fruits of these studies.

At the end of 1965, the archaeological field investigation of the citadel of Louisbourg was complete except for a well in the King's Bastion terreplein and two traverses in the bastion ditch between the revetted glacis and the Dauphin curtain. This archaeological program functioned successfully as a concentrated team effort to provide pertinent information toward the accuracy of the reconstruction, and at the same time to salvage the information which has been destroyed forever by that reconstruction. Any such archaeological effort must try to provide sufficient information, in both breadth and depth, so that the reconstruction program may be whatever the people in charge of policy may wish to make it.

27 Cut stones are numbered, recorded *in situ*, and then removed to a storage building for further study. Here, by a process similar to the work on paving stones, one side of a drain orifice is being reassembled. Four holes can be seen in the sill, for bars which blocked the drain so men could not crawl through it.

Reports derived from Archaeological Work at the Fortress of Louisbourg before 1966

Except as noted, all reports listed are unpublished manuscript reports in the Fortress of Louisbourg project files, and were written for internal use and for reconstruction purposes.

Structural or Survey Reports

Akerman, Jeremy B.
1965
The Casemates in the Left Flank of the King's Bastion: A Survey of Available Evidence.

Fry, Bruce W.
1964a
Archaeological Report on the Left Face Interior Revetment of the King's Bastion.
1964b
Princess Half-bastion (Rescue Work).
1964c
Archaeological Report on the South Half of the Chateau, Fortress of Louisbourg, N.S.
1966
Archaeological Report on the Right Flank Escarp of the King's Bastion.

Gluckman, Stephen J.
1963a
Preliminary Report: Underwater Archaeology of the Harbour and Coast of Louisbourg, Nova Scotia.
1963b
Final Report: Underwater Archaeology of the Harbour and Coast of Louisbourg, Nova Scotia.

Graham, John R.
1961
A Report on the Defences of the City, and On the Siege Works Constructed by the English.
1962
Archaeological Survey of the Grand Battery, Louisbourg, N.S.

Hansen, Erik S., and J. Sharman Bleakney
1962
Underwater Survey of Louisbourg Harbour for Relics of the Siege of 1758. Acadia University Institute, Wolfville, N.S.

Harper, J. Russell
1959
The Fortress of Louisbourg. A report of preliminary archaeological investigations carried out in the summer of 1959 under contract with the Department of Northern Affairs and National Resources.

Harrison, Peter D.
1964
Archaeological Report on the Right Face Casemates of the King's Bastion.

Howard, James H.
1963a
Preliminary Report: Archaeology of the King's Bastion, Fortress of Louisbourg.
1963b
Final Report: The Archaeology of the King's Bastion, Fortress of Louisbourg.

Lane, Richard B.
1964
Archaeological Report of the Terreplein of the King's Bastion, Fortress of Louisbourg.

Marwitt, John P.
1966
Archaeological Investigation of the King's Bastion Outer Works, Fortress of Louisbourg.

MacLeod, Donald L.
1965
Archaeological Report on the Right Flank, King's Bastion.

Vogel, Joseph O.
1965
Archaeological Report on the King's Chapel, Chateau St. Louis.
1966a
An Archaeological Report on the Postern Tunnel, King's Bastion.
1966b
Archaeological Report on the Townside Fortifications, Fortress of Louisbourg.

Walker, Iain C.
1963
Preliminary Report: Excavations at King's Bastion, Fortress of Louisbourg, September to December, 1962.
1964a
Excavation Report on Well found in the Basement of United Church, Louisbourg, N.S.
1964b
Archaeological Report on the North Half of the Chateau, Fortress of Louisbourg, N.S.
1966a
Archaeological Report on the Revetted Glacis of the King's Bastion.
1967a
"Excavation with a Backhoe." *Ontario Archaeology,* Publication No. 10.

Artifact Reports

Dunton, John V. N., and Rendo H. Marwitt
1965
Chateau St. Louis, Archaeological Furnishings Report, Part I, Vols. I-VI. On glass, small finds, faience, coarse earthenware and building hardware.

Gail, Patricia L., and Kathleen R. Lynch
1962
A Preliminary Analysis of the Artifacts from the Fortress of Louisbourg.

Marwitt, Rendo H.
1966
A Punch Card Code for Glass Analysis.

1966
Analysis of Wine Bottles from the Fortress of Louisbourg.
1967a
"Punch Card Design for Ceramic Analysis." *The Conference on Historic Site Archaeology, Papers, 1965-1966* (May), Vol. 1, pp. 19-26. Wilmington, N.C.
1967b
"A Preliminary Survey of Seven Coarse Earthenwares from the Fortress of Louisbourg." *The Conference on Historic Site Archaeology, Papers, 1965-1966* (May), Vol. 1, pp. 53-59. Wilmington, N.C.

Ormwake H. Geiger
1961
Report on the Clay Tobacco Pipes from Casemate Right 4, King's Bastion, Fortress of Louisbourg.

Swannack, Jervis D., Jr.
1966
Paving Stones of the King's Bastion.

Walker, Iain C.
1965a
A Study of Clay Pipe Fragments from Casemate Right 1, King's Bastion, Fortress of Louisbourg.
1965b
"Some Thoughts on the Harrington and Binford Systems of Statistically Dating Clay Pipes." *Archeological Society of Virginia, Quarterly Bulletin* (Dec.), Vol. 20, No. 2, pp. 60-64.
1966b
A Study of the Clay Pipes from Casemates Right 10 to 15, King's Bastion, Fortress of Louisbourg.
1966c
Chateau St. Louis, Archaeological Furnishings Report, Part I, Vol. VIII. Clay Tobacco Pipes.
1966d
"TD Pipes – A Preliminary Study." *Archeological Society of Virginia, Quarterly Bulletin* (June), Vol. 20, No. 4, pp. 86-102.
1966e
"A Pipemaker's Mark from Gouda, The Netherlands – Then and Now." *American Antiquity*, Vol. 31, No. 5, Pt. 1 (July), Salt Lake City.
1966f
"Dating from Modern Bottles." *El Palacio*, Vol. 73, No. 3 (Autumn), Santa Fe.
1967b
"Clay Pipes from the Fortress of Louisbourg, Nova Scotia, Canada." *The Conference on Historic Site Archaeology, Papers*, 1965-1966. (May), Vol. 1. Wilmington, N.C.
1967c
"Clay Pipes from the Fortress of Louisbourg." *Archaeology* (June), Vol. 20, No. 3, pp. 187-93. Columbia, Mo. These are both derived from a longer paper delivered at the ESAF Conference, November, 1965. There is a résumé of this on pp. 14-15, *Eastern States Archaeological Federation Bulletin*, No. 25 (May). Trenton, N.J.

Other Reports

Anderson, James E.
1964
The Human Skeletons in the King's Chapel, Fortress of Louisbourg.

Macdougal, J. I.
1964
The Louisbourg Park Area. A survey of the soils in the Fortress and surrounding vicinity.

*Hunter College, New York

A "Rescue Excavation" at the Princess Half-bastion, Fortress of Louisbourg

by Bruce W. Fry

Abstract

Coastal erosion necessitated the excavation, recording and removal of a section of the Fortress of Louisbourg fortification front which was in danger of collapse and rapid deterioration. Because of the emergency nature of the operation, no historical sources relating to this specific area were searched prior to excavation, and the deductions made were based primarily on the archaeological evidence as it related to the general history of Louisbourg as a whole. While the structural nature of the area investigated was apparent from a purely archaeological interpretation, the date and purpose of subsequent modification could only tentatively be deduced. The excavation thus provided an interesting example of the limitations of archaeological deduction in the absence of intensive research into historical sources.

The settlement of Louisbourg was started by the French in 1713 on Cape Breton Island, Nova Scotia. In 1745, the French surrendered to a combined force of New Englanders assisted by the British, although the fortress was later returned to the French in 1749. The British once again successfully besieged the fortress in 1758 and, fearful that it would be restored to the French, systematically demolished its fortifications in 1760.

Edward McM. Larrabee (1970) described the archaeological research at the Fortress of Louisbourg which took place from 1961 to 1965. During that time, attention was concentrated on the King's Bastion, although there were several minor excavations in other locations of the fortress. One of these briefly mentioned by Larrabee is that of the author's salvage work on the Princess Half-bastion in 1964. This paper describes that excavation and its results.

The Princess Half-bastion is located on the south shore of the rocky promontory occupied by the ruined fortress, and is at the end of the fortified front of bastions which defended the French town against attack from the country (Fig. 1). Remote from the King's Bastion complex and the main area of the town, the Princess Half-bastion has, to date, received little attention under the current restoration programme, although documentation has been recently studied. In spite of the concentrated effort on the Citadel, however, it was felt worthwhile to devote some time to a small-scale rescue operation at the Princess Half-bastion when certain features were exposed by severe storms and high tides.

The bastion was constructed so that its flanked angle, the right face and right flank confronted the country in a conventional manner, but its left face was parallel to the shore. The eroded appearance of these seaward-facing ramparts, together with an appreciation of the British demolition in 1760 in this area (Fig. 2) gave little hope that anything of significance had survived. But in November, 1963, storms and high seas exposed some 30 dressed sandstones ("cut stones") on the beach. Because of the cut-stone study then in progress for the Citadel (the stones provided architectural information of prime importance to the restoration), the significance of the stones found on the beach was readily appreciated, and they were duly recorded, catalogued and removed to safe storage.

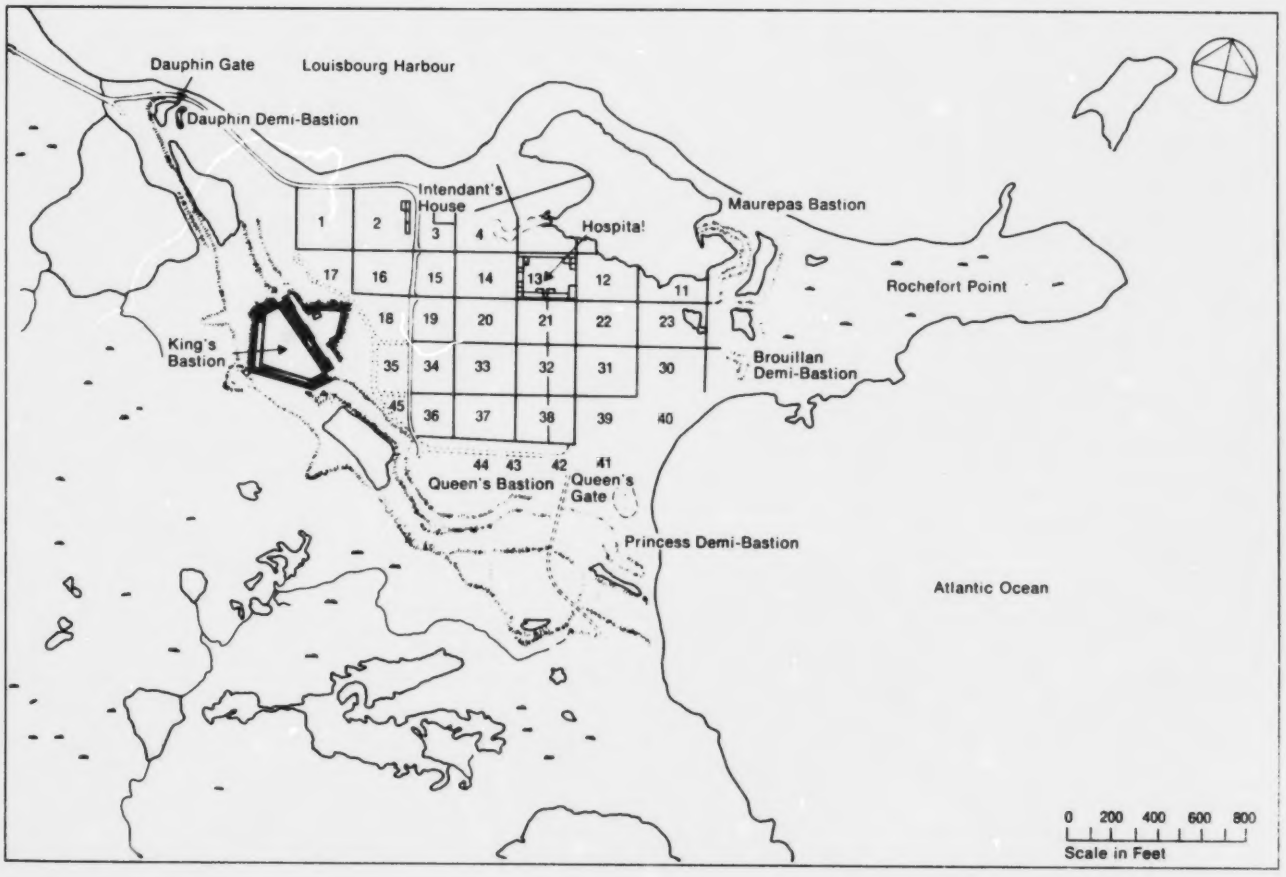
The following spring, further erosion along the seaward defences exposed a section of rubble masonry escarp, still surviving intact. There was, moreover, an indication that a cut-stone feature was also surviving intact, incorporated in the escarp (Fig. 3). Thus the opportunity was taken to examine a well-preserved section of the defences, albeit a small one, before further erosion and collapse could occur.

The archaeological investigation was limited to a trench across the escarp to expose the feature completely, to determine its relationship to the defences and to remove it before it was damaged further. No historical information was available at the time.

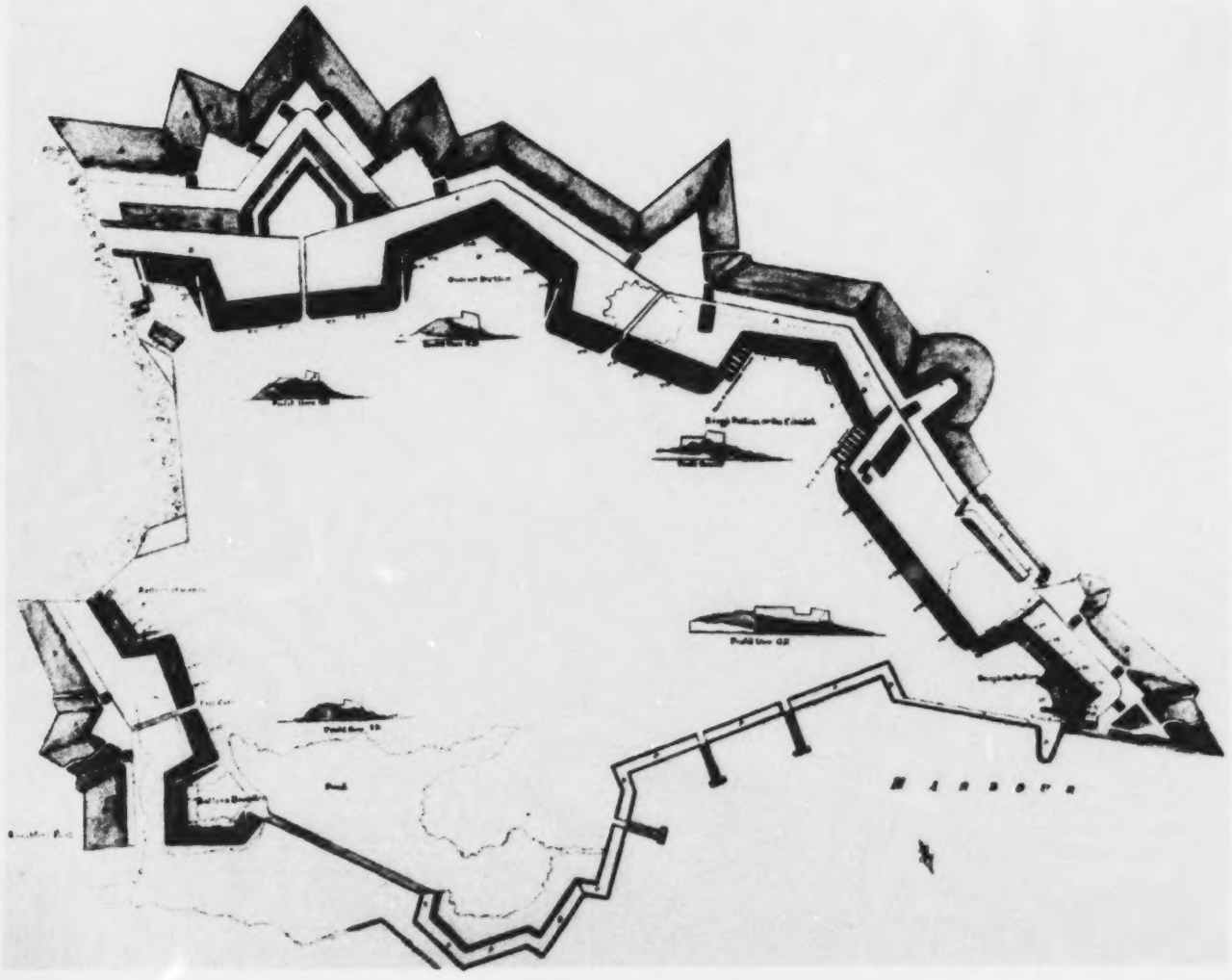
As originally exposed, the cut-stone feature appeared to be a musket slit (Fig. 3); when fully uncovered, it proved to be an unusual example of such a defensive work. The stones had been cut to form a conventional musket slit, but at the bottom the slit opened out into a circular aperture (Figs. 4 and 5). The feature, best referred to perhaps as a loop-hole for small arms, comprised 18 pieces of dressed sandstone, all hand-cut to a neat finish, but not so precise as to form a perfect circle at the round aperture, nor to be completely symmetrical. The exterior face of the stones was cut to a batter of 1 in 12 (corresponding presumably to the batter of the seaward escarp). Apart from the batter and the exterior face finish (rough pointed), the loop-hole was identical when viewed from front or rear: slit and aperture flared equally in both directions from a constricted centre. At its narrowest, the slit was 4 in. wide, and the circular aperture 9.5 in. in diameter. The slit flared out to a width of 10 in. and the aperture below to a diameter of 21 in. The entire unit was 5 ft. high.

Because this section of the defences commanded rocky shallows, there was

1 Fortress of Louisbourg – map showing location of defensive works.

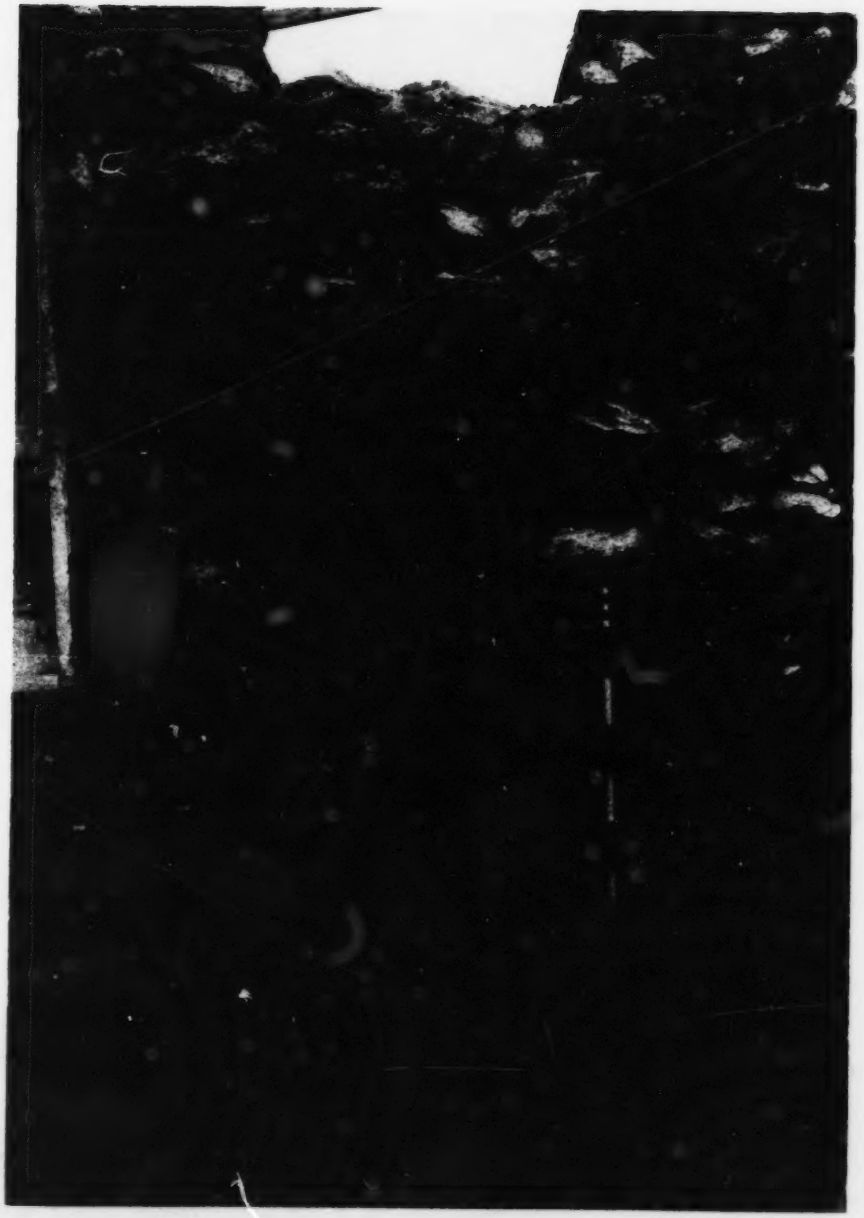


Copy of the British engineers' demolition plan, 1760.



3 The small-arms loop as first discovered.

4 The loop-hole fully exposed.



little need to guard against large enemy vessels sailing within range, but rocky bluffs immediately to the south of the Princess Half-bastion created a large blind spot which would enable small boats to land without being exposed to fire. Lest a force attempt an overland advance from this protected beach, the landward defences were strengthened with a ravelin in the ditch. The seaward defences were presumably designed, therefore, to counter any movement along the shallows, either by small boats or by wading troops.

The narrow slit of the loop-hole was obviously designed for a musket, but the use for which the circular aperture was intended is conjectural. Possibly a musketeer, by kneeling, could command a larger field of fire. More effective from a tactical point of view, however, would have been the use of a small (four to six pounder) field gun loaded with shrapnel to sweep the shallows.

Excavation showed that access to the loop-hole was by means of a gallery running along the flank (Fig. 6). This had been formed by constructing a rubble masonry wall parallel to the escarp and spanning the gap with a rubble masonry vault lined with brick. Earth was tamped down on top of the roof of the gallery to complete the rampart fill. A plank floor was laid on natural clay along the length of the gallery. The width of the gallery at floor level measured 9 ft., but distortion of the masonry due to a demolition charge which had been exploded nearby affected the accuracy of measurements within the gallery. It was difficult, also, to determine the height of the gallery. The spring of the vault was 5 ft. 9 in. above the floor: the curvature appeared to be considerably flatter than that of a barrel vault; and a height of about 8 ft. above the floor would therefore seem to be reasonable.

The length of the gallery was not determined during the course of this excavation, but there were clear indications that several loop-holes had existed in it. Distribution of cut-stones along the beach, together with visible remains of brick relieving arches

5 Isometric drawing showing the construction of the loop-hole.

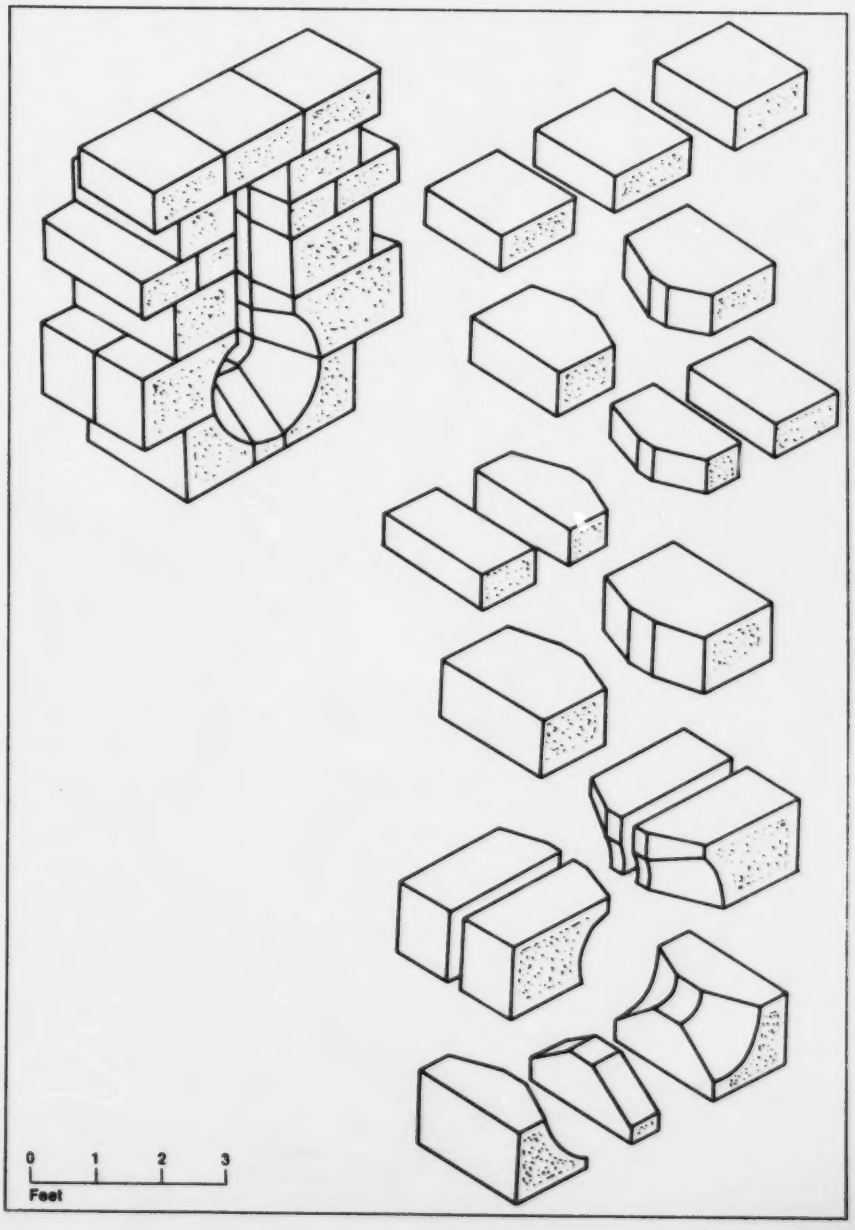
similar to that above the cut-stone lintel of the intact loop-hole, suggested that a minimum of three more loop-holes, spaced at approximately ten-foot intervals, had existed formerly.

Excavation also provided evidence of modifications to the gallery. The loop-hole itself had been thoroughly plugged with rubble and lime mortar (Fig. 4). Moreover, an additional wall had been constructed against the interior of the escarp (Fig. 6), thus effectively blocking any access to the loop-hole from the inside. There was every indication that this wall continued the length of the gallery, blocking the other loop-holes as well. On the exterior, layers 13 and 14, as shown in Figure 6, overlay the footing of the escarp, and may reasonably be assumed to be construction debris deposited at the time the gallery was modified.

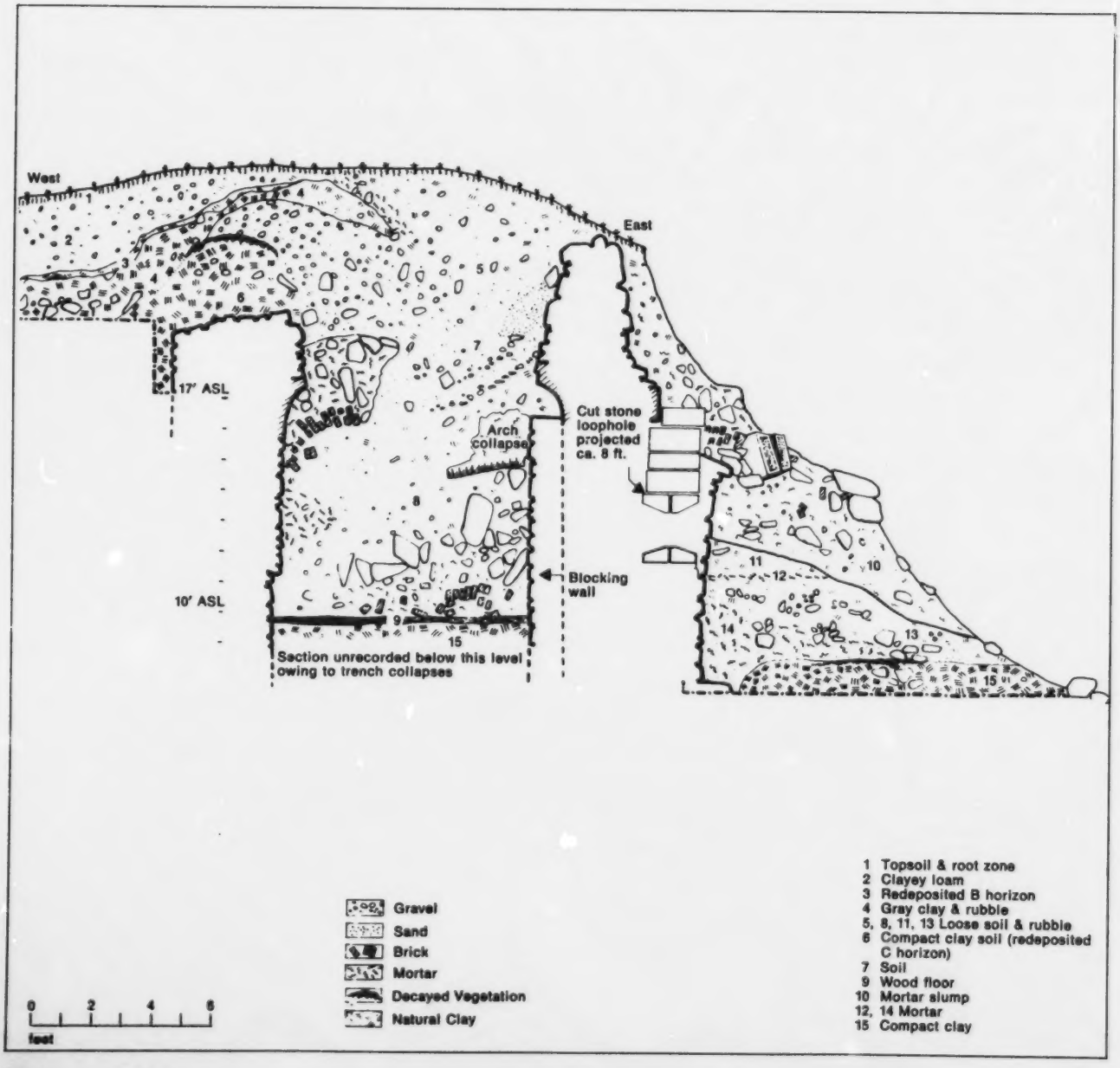
From both of these layers came sherds of pottery and glass. The pottery sherds proved to belong to one vessel – a bowl of Staffordshire ware with a base diameter of 4.5 in., of a style that was common throughout the first half of the 18th century. Not enough glass was present for positive identification, although it appears to have belonged to a British vessel common around 1750.

The British, who occupied Louisbourg from 1745-49 following the first siege, may have been responsible for modifications to the gallery. If this were the case, it would explain the presence of British artifacts in the layers associated with repair work, although excavation revealed no clue as to why the occupying forces would take an interest in this part of the defences.

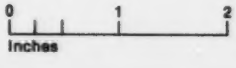
Some time after the excavation, historical evidence was found which corroborated the archaeological conclusions and explained the reasons for the blocking: the British, finding that these coastal defences were of little importance, sealed up the loop-holes and converted the gallery into a powder magazine. The French, on their return to Louisbourg, clearly did not think it worthwhile to reverse the decision to close the gallery.



6 Section through the seaward defences of the Princess Half-bastion.



7 Reconstruction of Staffordshire pot.



Fortier, Margaret
1966
Princess Bastion Report. Unpub. MS. Fortress of Louisbourg, pp. 28-31.
Primary Sources Cited by Fortier:
30 September 1747. Military Affairs at Louisbourg. Library of Congress Microfilm; 30 October 1748. Beauharnois. Archives de la Marine, Series B[4], Vol. 62, fol. 90; 12 July 1749. "State and Condition of the Fortifications Publick and private Buildings of Louisbourg and the out Batteries, as they were on the 12th day of July 1749 . . . ." Colonial Office Records. A34, Nova Scotia, p. 160.

Larrabee, Edward McM.
1970
"Archaeological Research at the Fortress of Louisbourg, 1961 to 1965." *Canadian Historic Sites: Occasional Papers in Archaeology and History, No. 2.*

Plan References

The gallery and loop-holes are shown on the following plans (Fortress of Louisbourg catalogue numbers):

1734-3
Plan de Louisbourg en l'Estat quil est 1734 ou lon a representé en couleur jaune par les profils les ouvrages qui resent a faire pour perfectionner l'Enceinte a la quelle on travaillera l'Année 1735.

1737-1
Plan de Louisbourg ou on a representé en couleur jaune les ouvrages projetés qui doivent ce fair pendant l'année 1737 pour la perfection de l'Enceinte et de fes dehors.

1737-3
Louisbourg 1737. Plan d'une partie du Bastion Princesse et de la Batterie du cap noir au prolongement de la quelle on a representé en couleur jaune l'Eperon projeté pour empecher de mer basse la communication dans la ville.

1744-5
Plan de la Ville de Louisbourg dans l'Isle Royalle. 1744.

1745-1
Plan de la Ville du Port de Louisbourg de ses batteries avec sa perspective ou l'on voit les ouvrages de fortiffication faites par les Anglais pour lattaque de la Place et de fes Batteries.

Fortress of Louisbourg, Restoration Section

An Archaeological Study of Clay Pipes from the King's Bastion, Fortress of Louisbourg

by Iain C. Walker

Abstract

The clay pipes studied came from tightly-controlled excavation areas, certain casemates in the right flank and right face of the King's Bastion, Fortress of Louisbourg, Nova Scotia. An examination of the pipe material, in conjunction with the archaeological and historical evidence, indicated that one casemate had deposits datable to about 1700-1749/50; 1749/50 to 1755; and 1755 to 1760, while three others had material datable to 1720-about 1732. Thus a valuable key is provided for the dating of the same material in other, less well-dated, sites on both sides of the Atlantic.

The pipe material included a large amount of Dutch material which evidence suggests was connected with the purely French occupation. English pipes were used both by the French and British, however. A number of hitherto unrecorded or unpublished Dutch and English maker's marks were found and where possible, these marks and their users were identified and dated.

Acknowledgements

Casemate 1 Right was excavated by my wife Ll. de Sansoucy Walker between February and July, 1964, under the supervision of Donald G. MacLeod of the Fortress of Louisbourg Restoration Section, lately of the Archaeology Division, National Museum of Man, National Museums of Canada, Ottawa. The care of the workmen, in particular Mr. Alex MacNeil and Mr. Alfred Simmons, contributed greatly to this study. The writer wishes to state that the interpretation of the findings is entirely that of himself and his wife and that it takes into account stratigraphic and historical evidence but no artifact evidence other than that from the pipes. The right face casemates were excavated under the direction of Peter D. Harrison, at that time with the Fortress of Louisbourg Restoration Section and now of Trent University, Peterborough, Ontario, during the summer of 1963. As with Casemate 1 Right, only stratigraphic and historical evidence from this area is used in this study.

I should like to express my sincere gratitude to the many people whose correspondence has helped elucidate many points and contributed greatly to the final structure of this work. In particular, I should like to acknowledge the unstinting help and encouragement of the late H. G. Omwake.

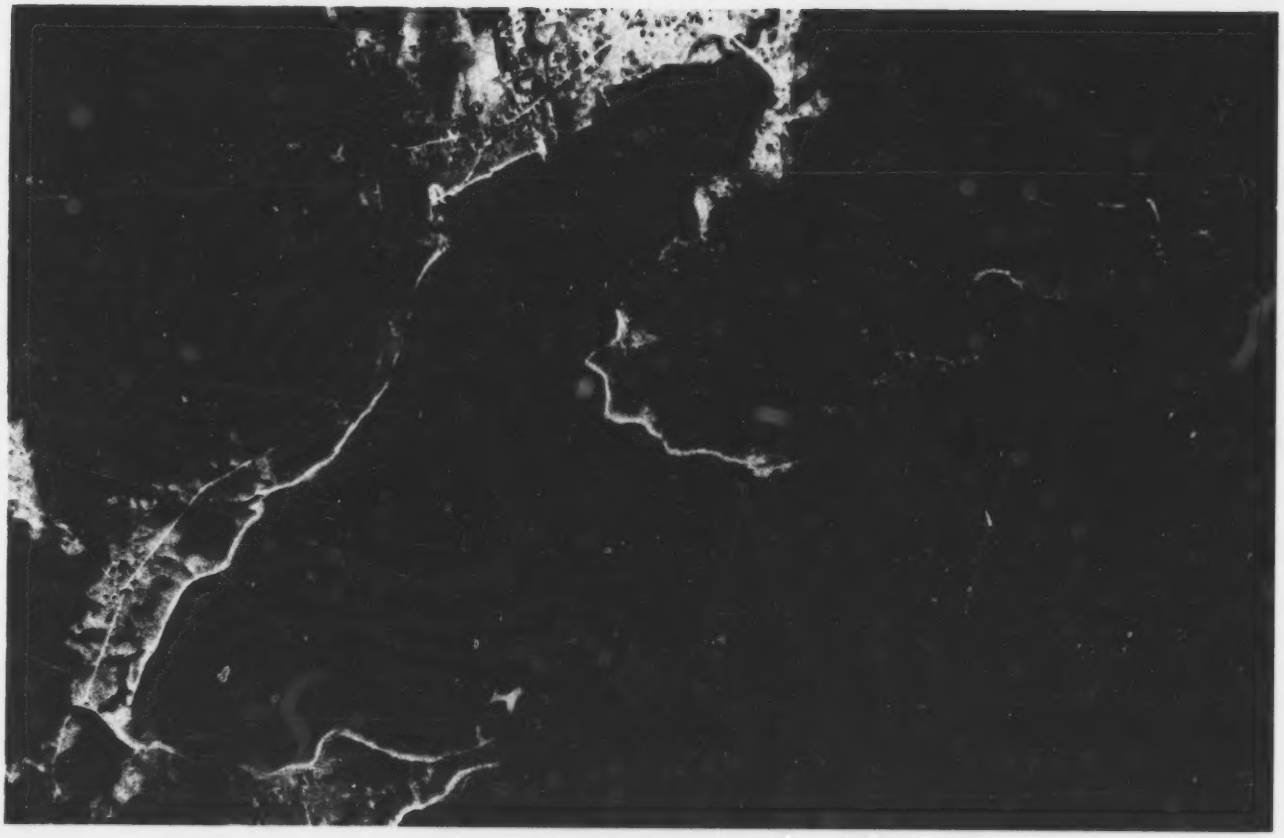
In the first part, Figure 1 is from an original taken by the Royal Canadian Air Force; Figure 2 is from an original in the National Air Photography Library; Figure 3 is from a copy of a map held by the Fortress of Louisbourg Restoration Section; Figure 4, *a-c* are from originals held by the Restoration Section; Figure 4, *d* is from an original taken by the Nova Scotia Tourist Bureau, Halifax, Nova Scotia; Figure 27 is by the writer; Figures 31 and 33 are by Ll. de Sansoucy Walker; Figures 32 and 34 are by A. MacNeil of the photographic department of the Restoration Section. In the second part, Figure 37 was taken by A. MacNeil, and Figure 48 is by the writer. All other photographs were taken by Georges Lupien, National Historic Sites Service, Ottawa.

The text of the first part has been in manuscript form since January, 1966, and of the second since February, 1966. Some references to subsequently available information have been included, but material from the writer's present research at the University of Bath, England, on pipe-making in general and the Bristol industry in particular; and from A. Oswald's recent work on the pipes from Port Royal, Jamaica (*Clay Smoking Pipes recovered from the Sunken City of Port Royal*, vols. I [1968] and II [1969], R. F. Marx, Jamaica National Trust Commission, Kingston, both volumes mimeographed typescript) have not been included as this would have involved too radical a set of additions. Similarly, the important study of London pipemaking by D. Atkinson and A. Oswald ("London Clay Tobacco Pipes," *Journal of the Archaeological Association*, vol. XXXII, 3rd ser. [1969] pp. 171-227) appeared too late for incorporation of its material, as did A. Oswald's "The Clay Tobacco Pipe: Its Place in English Ceramics," *Transactions of the English Ceramic Circle*, vol. 7, pt. 3 (1970), pp. 222-45; while a copy of S. Laansma's *Pijpmakers en Pijpmerken 1724-1865* (privately produced in mimeograph in 1960) was not obtained by me until July, 1969, again too late for its extensive additional information on Gouda makers to be incorporated.

Part I

The King's Bastion and its Casemates

1 Louisbourg Harbour from the air, 1947. Modern town at NE. end of harbour, French fortress and town on SW. side of harbour entrance.



This study is an attempt to correlate the stratigraphic evidence obtained and the dating evidence suggested by clay pipe fragments recovered from the excavation of the King's Bastion and its casemates. The area under consideration was a casemate, designated 1 Right, approximately 34 ft. long by 12 ft. wide and filled to a depth of 7 ft., in the right flank of the King's Bastion, Fortress of Louisbourg, Nova Scotia.

The fortress was constructed by the French, who, forced to leave Placentia, Newfoundland by the Treaty of Utrecht in 1713, settled at Louisbourg in the same year. In 1716, the area was surveyed with a view to constructing fortifications, and in 1720 building was commenced. The defences took the form of a double-crowned work following Vauban's First System of Fortification, cutting off the landward side of the southern peninsula commanding the harbour entrance (Figs. 1, 2).

Construction started with one of the crowns, called the *Bastion du Roy* or King's Bastion, work commencing on its right, or north, flank (Fig. 3). This right flank held six casemates of the same size as Casemate 1 Right (Fig. 4), and a small seventh casemate at the right shoulder angle where the right flank met the right face. In the right face eight small casemates were projected, but although work started on all eight, only two were ever completed; however, during a delay of some years in the construction of the casemates, the foundations of six were utilized for various purposes, as revealed by archaeological investigation. Accordingly, these casemates and those in the right flank have been designated Casemates 1-15 Right and will be referred to as such in the text when comparisons with other material are made.

Across the gorge of the bastion was constructed the Chateau St. Louis, which contained the chapel, Governor's quarters

2 French fortress and town of Louisbourg from the air, 1961. Arrow indicates King's Bastion.

and, originally, the Intendant's quarters. Occasional references will be made to material found during the excavations of this area.

Historical evidence indicates that though the first excavations for the construction of the King's Bastion were made in 1717, work did not commence in earnest until 1720, when the right flank and casemates were begun. By 1724, on historical evidence, the arches of these casemates (1-6 Right) had been completed; so, too, from indirect historical evidence must have been those of Casemates 7-9 Right. Thereafter there was apparently no further work done on casemate construction until the early 1730s. About 1732, the foundations of Casemates 10-15 Right appear to have been filled in, and the paving of the platforms above the right flank casemates, begun in 1731, was completed in 1733.

As records note that scaffolding still in place in the casemates prevented any of them from being used as late as 1726, it seems unlikely that there should be occupation material in any of the casemates previous to this date, other than casual material dropped before and during the construction or rubbish surreptitiously deposited there. As there is a reference in 1727 to a prison having been constructed in one casemate, it seems probable that major occupation material can be expected from about this time. Because the left flank of the bastion contained six large and one small casemates similar to those in the right flank – and indeed small casemates in the left face were at one time postulated as well – it is not always clear to which casemates the documents refer, but the majority of references are to the right casemates. In any case, the chronology of the left casemates must have been fundamentally similar to that of the right – considerable work was done on their foundations in

1722 and a reference in 1725 to unsatisfactory construction indicates that at least one casemate here was completed by that time – and it may be said that effective occupation of all casemates in the King's Bastion, left and right, commenced about 1726.

The fortress was besieged twice and captured both times. In 1745, New Englanders took it with the assistance of the British, who returned the fortress to the French in exchange for Madras in 1749. In 1758, the British captured the fortress and in 1760 systematically razed the entire line of defences protecting the town, leaving at the King's Bastion only Casemates 1-3 Left and 1-4 Right still standing. Until 1768, a British garrison remained, and the town inside the erstwhile fortifications continued for several decades: in fact, farms and fishermen's cottages remained until the area became a National Historic Site in 1928. By the end of the 19th century, photographs indicate that the back walls of the surviving right casemates had collapsed into the casemates, effectively sealing the deposits underneath. Unfortunately, there is no evidence to indicate when this occurred, whether in 1760 or at any time in the following hundred or more years. A photograph taken in 1893 from the back of either Casemate 1 Right or 2 Right, looking towards the left casemates, suggests the former were as full of rubble then as in 1961.

In the first decade of this century, restoration work was done by D. J. Kennelly on both sets of casemates, but his death in 1907 brought to a halt his grandiose but eccentric and innaccurate schemes. In the 1930s, the Canadian government dug out much of the chateau and restored or rebuilt parts of the chateau and the casemates. The present work, also sponsored by the Canadian government, commenced in 1961.

The damage done in both sieges and the repair work have a bearing on the archaeological interpretation of Casemate 1 Right, but these considerations will be left until the historical-archaeological evidence is discussed, when this evidence will be compared with the clay pipe evidence.

Historical references to the casemates between the 1760s and the beginning of the present century are few, and not particularly helpful. At the beginning of this century, the three surviving left flank casemates still had their backs and tops, though not their fronts, which were rebuilt by Kennelly. In 1861, there is a reference to three of the casemates being used as sheep pens (logically, the three left casemates), and in 1849, there is a reference to three casemates being used as sheepfolds and a fourth being used as a cabbage patch. This latter might indicate that at that time a fourth casemate was usable, but one would not normally grow cabbages in the dark and it is tempting to suppose that Casemate 4 Left was the one referred to, since it was open to the sky, shallow, yet protected to its northeast by the still-standing Casemates 1-3 Left and protected on the other sides by mounds of rubble which did not exclude the sun from its roughly southwestern exposure. If so, then the evidence might suggest that the right casemates were even then unusable because their collapsed back walls and attached roofing had already filled them. (As no trace of the fronts has been found in any of these casemates, it appears probable that they were dismantled at some time.) In 1785, there is a reference to some of the casemates being "in a solid state," implying that others had collapsed, but these others may have been those demolished in 1760. In 1853, there is a reference to "the bomb-proof cassines [sic] and the arches beneath the citadel" still standing, and "arches" very aptly describes the backless and frontless ruins of the right casemates as we later know them to have been. A picture taken not later than 1901 shows them without backs or fronts.

It seems likely, therefore, that the right casemates lost their backs relatively early; although it could have been as early as the demolition itself or in the first half of the 19th century. There is no reason why the disintegration should not have taken place over a period of many years. The possibility that the casemates could have been used by the English garrison until 1768 should not be ruled out, however.

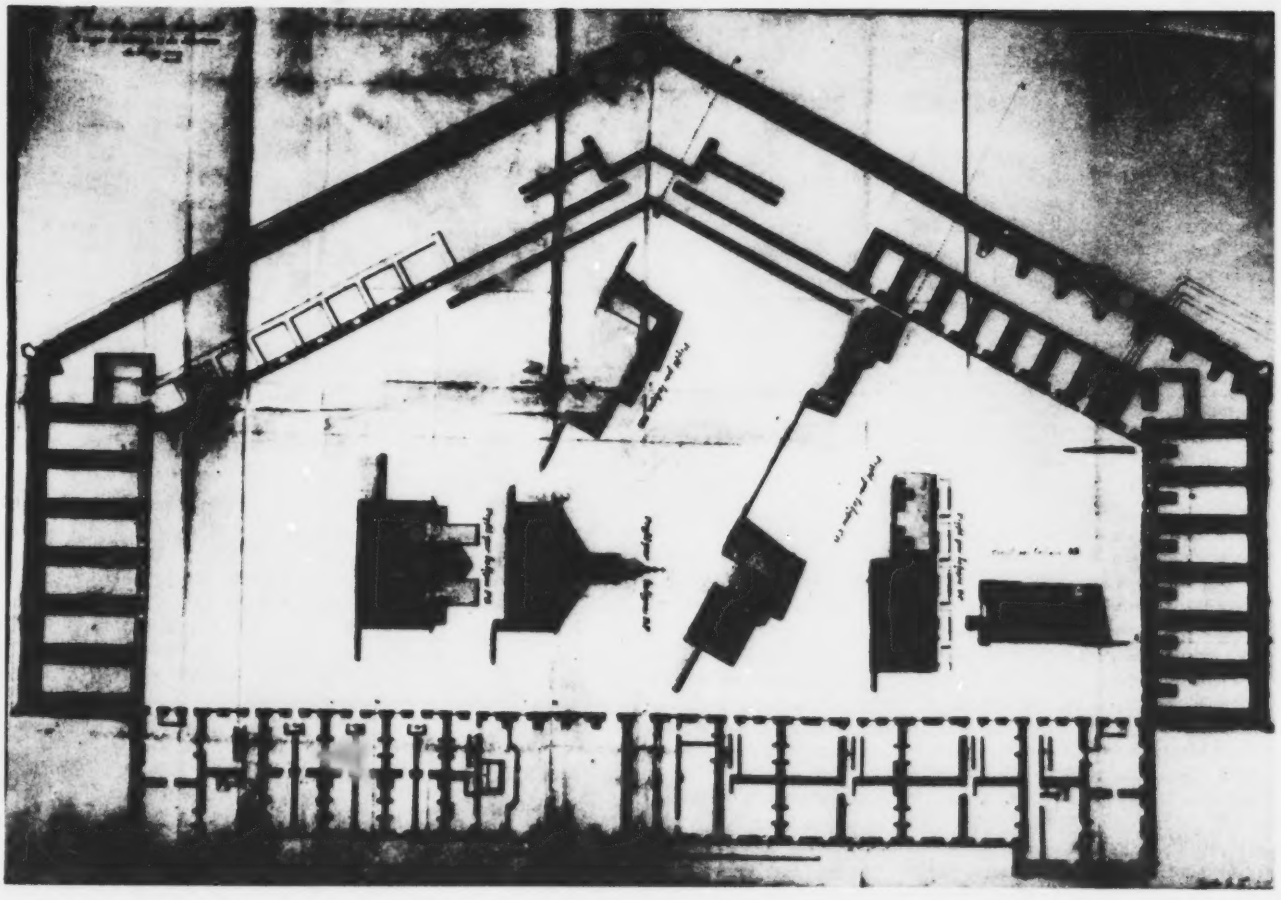
Because the time span of the casemate under study is relatively short (about 50 years) dating of pipes has been done primarily on the evidence of makers' marks and names. With the exception of the Dutch bowls, all bowls from which the shape could be deduced appeared to be basically of Oswald's type 9 (Oswald 1961: 60, 61). This type of bowl seems to have been the result of the influence of a Dutch pipe type – brought over by the troops of William III at the time of the English Revolution in 1668 – on the traditional barrel-shaped English pipe bowl.[1] Oswald dates this type to about 1680-1730, noting that in England it occurs in the West Country (that is, the Bristol area) and in London and the Home Counties. In the New World at least, the export version (Oswald's type 9c) and numerous variants and derivatives were universal long after this, and certainly as late as about 1780 (I. Noël Hume 1963: 262). In England, Oswald's type 10 continued the more traditional features in various forms. This type continued for most of the 18th century until type 11, a derivative of type 9, became standard and finally set the norm for what is traditionally considered the shape of a British clay pipe. In the New World, however, as indicated above, the type 9 shape was universal – perhaps because Bristol, where such pipes are datable to before 1700, was such an important export centre – and there seem in fact to have been definite "export only" models.

Harrington's method of dating pipe fragments by bore diameter measurement (Harrington 1954) was not used in this study, as the relevant Harrington period, 1710-50, covered virtually the entire occupancy of the area involved. Binford's straight-line regression formula based on Harrington's work (Maxwell and Binford 1961: 107-9; Binford 1962: 19-21), however, was applied to the various layers in order to obtain comparative evidence.

The order of layers in this casemate from top to bottom runs from Layer 1 to Layer 12, inclusive.

No significant pipe material came from Layer 1. In Layer 2 the following material

3 French plan of King's Bastion, dated 1724. Casemates 1 Right and 10-15 Right indicated.



	Layer 2		
29.1:	Spur and bowl fragment, with B on left side of spur, raised; right side of spur illegible.	55.1:	Stem fragment and part of heel, foot of letter probably T on left of heel, D on right.
29.7:	Bowl fragment, heel and stem fragment, $\frac{V}{SO}$ raised on base of heel, the arms of the city of Gouda raised on a projection on either side of heel and surmounted by a raised S, the mouth of the bowl having a milled edge (Fig. 5, *a-c*).	55.3:	Bowl fragment and heel, probably crowned F on left side of heel, crowned S on right.
32.5:	Bowl fragment, vague design resembling a heart in a circle of irregularly shaped dots on right side of bowl, all raised (Fig. 6).	55.4:	Stem fragment with the letters DUNIER- (the letters U and I are uncertain) followed by an indecipherable letter or letters with two vertical strokes, raised from a depressed border; below the word a toothed edge and above, possibly, a straight line.
32.6:	Bowl fragment and part of stem, part of a design the same as above, extremely vague.	60.1:	Bowl fragment and stem fragment, crowned 6 raised from a depressed surround in two concentric ovals on base of bowl; coat of arms of city of Gouda similarly beside it to left; the mouth of the bowl has a milled edge.
48.1:	Bowl fragment and heel, R on left side of heel, B or R on right; large, spidery letters.		
48.2:	Bowl fragment, mermaid in oval impressed on base (Fig. 7, *left*).		

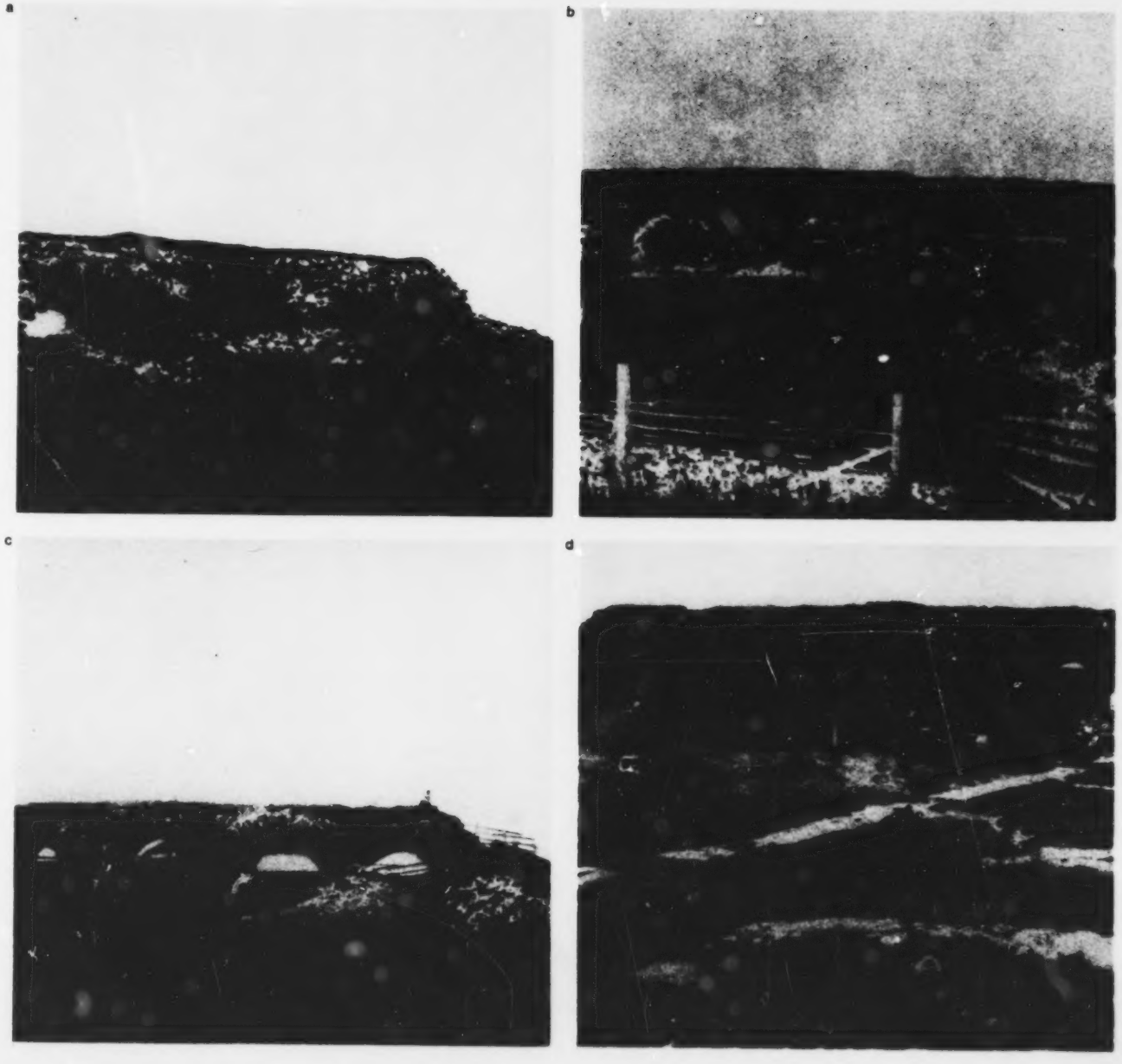
was studied (the catalogue number given is the lot number followed by the object no.).

The standard work on the pipemakers of Gouda (Helbers and Goedewaagen 1942) does not list a crowned 6, but it is illustrated along with other marks all captioned merely as 18th century (Pl. VIII). The coat of arms of the city of Gouda was put on certain Gouda pipes only after 1739-40 (Helbers and Goedewaagen 1942: 18, 48), however, so this pipe cannot be earlier than this date. That the crowned 6 was in use prior to 1739 is suggested by its occurrence on a pipe without the coat of arms from Santa Rosa Pensacola, Florida, a Spanish settlement founded in 1722 (Omwake 1964: 23-4). (There is confusion as to the meaning of the coat of arms. Gouda pipes came in three qualities known as *porceleyne, fijne,* and *slegte* – porcelain [actually a high polish], fine, and ordinary – and in November, 1739, according to Helbers and Goedwaagen at one point [p. 18] to prevent merchants mixing pipes permission was given to differentiate the *porcelain* class by adding the Gouda arms to the bowl. However, sales of *fine* pipes dropped so much because buyers thought they were *ordinary* pipes that on 4 March 1740 permission was given to mark *fine* and *ordinary* pipes with the arms, surmounted by the letter S [*slegte*], on both sides of the bowl. Elsewhere, however [p. 48], it is stated that in 1739 *fine* pipes were to have the single arms and that the 1740 authorization allowed the double arms and letter S for *ordinary* pipes, *porcelain* pipes presumably being left unmarked.) As Omwake notes only one other example of a pipe with the single coat of arms known to him in North America this example and that from Intrusion 1 can be considered very rare. (Two more pipes of this class were discovered at Fort Gaspereau, New Brunswick [1750-56], by the writer in 1966.)

The letters $\frac{V}{SO}$ are not listed by Helbers and Goedewaagen, but the same illustration that shows the crowned 6 illustrates this symbol. Again the arms of Gouda indicate a post-1740 date. While the maker of this pipe cannot be identified, a V in the middle of a three letter mark could stand for the "van" in a surname – for example, Barend van Berkel had the mark $\frac{V}{BB}$ (Helbers and Goedewaagen 1942: Pl. VIII and 127) – and there is recorded in Gouda a family of van Ommen. Several generations of this family were pipemakers, and at least one, Frans, was working at the time of Louisbourg (Helbers and Goedewaagen 1942: 188, 225). The only mark known to have been used by the van Ommen family at this time, however, was the crowned 79, and in fact it was extremely rare for a Dutch maker to use his initials as a mark.

The mermaid is a Gouda pipemaker's mark, but in this case the coat of arms is missing. The design on the pipe shown here is the earlier of two versions, on the original imprint of which it says, according to Helbers and Goedewaagen (1942: 170, No. 78; cf. 207, No. 222), "13 May 1745," which would appear to imply that this was when it was registered. However, another Gouda mark, the trumpeter, was first registered in 1674, and it is recorded (Helbers and Goedewaagen 1942: 196) that its original imprint bore an inscription dated 1769, so such inscriptions do not necessarily indicate a *terminus post quem.* The absence of the coat of arms from a pipe of as high quality as this example (and that in Intrusion 1) might support the version of the meaning of the arms noted above where the highest class of pipe, that called *porcelain,* did not carry the arms; on the other hand the arms

4 Four views of the Right flank casemates. *a*, not later than 1901; *b*, 1907; *c*, 1926; *d*, 1957.



5 Three views of a Dutch pipe bowl. The letters S/V/O on the base of the heel are the maker's mark, and the badge on either side of the heel is the Gouda coat of arms surmounted by the letter S. This letter (*s/egte:* Dutch, *ordinary*), with the Gouda arms, was first used in 1740, and indicates that this pipe belongs to the lower of the three qualities of Gouda pipes, known in descending order, as *porcelain*, *fine*, and *ordinary*. (The best-quality pipes were not, in fact, of porcelain, but of polished clay.) (*See* p. 62.) Context: 1755-60.

a

b

c

may not have been added by all Gouda makers, the pipes may have been a high-class imitation of Gouda pipes, or they might even have been made prior to 1739. The first known owner of this mermaid mark was Jacob Klaris. It was obtained on 31 July 1747 by Boudewijn Klaris and not apparently sold again until 7 August 1770. It is quite likely that this pipe and other examples to be noted at Louisbourg were manufactured by one or both of the Klarises.

The history of the letters TD associated with clay pipes has already been dealt with in some detail by the writer (Walker 1966a), though more study of these pipes is still required. It is virtually certain that the example here had on the front of its bowl (that is, the side facing the smoker) the letters TD with a decorative motif above and below, inside a thin rouletted circle, all impressed, similar to other pipes described below. Pipes with a similar design are common from camps of the period of the American Revolution (Calver 1931: 92, 93); from Fort Ligonier, Pennsylvania, occupied between 1758 and 1765 (J. L. Grimm, personal communication); from Fort St. Joseph, Michigan, which was maintained by the French until about 1760; from an Indian village site in Louisiana occupied intermittently until 1758 (both quoted by Omwake 1965: 18-9, from an ambiguous reference in Quimby 1942: 545-6), and at Fort Michilimackinac where Omwake (1962: 1-2) tentatively suggested a date of about 1755-65 for types that were possibly the earlier of two main variants found there. They also occurred at Fort Ticonderoga, New York (Gifford 1940: 128, 122, Fig. 13), founded in 1755, and nearby Fort William Henry, 1755-57 (Omwake 1962: 9), but in unknown contexts. On present evidence, therefore, TD pipes found at Louisbourg are unlikely to date to earlier than the mid-1750s.

6 English bowl with design on its right side of an object resembling a heart inside a circle of irregularly shaped dots. Context: 1755-60.

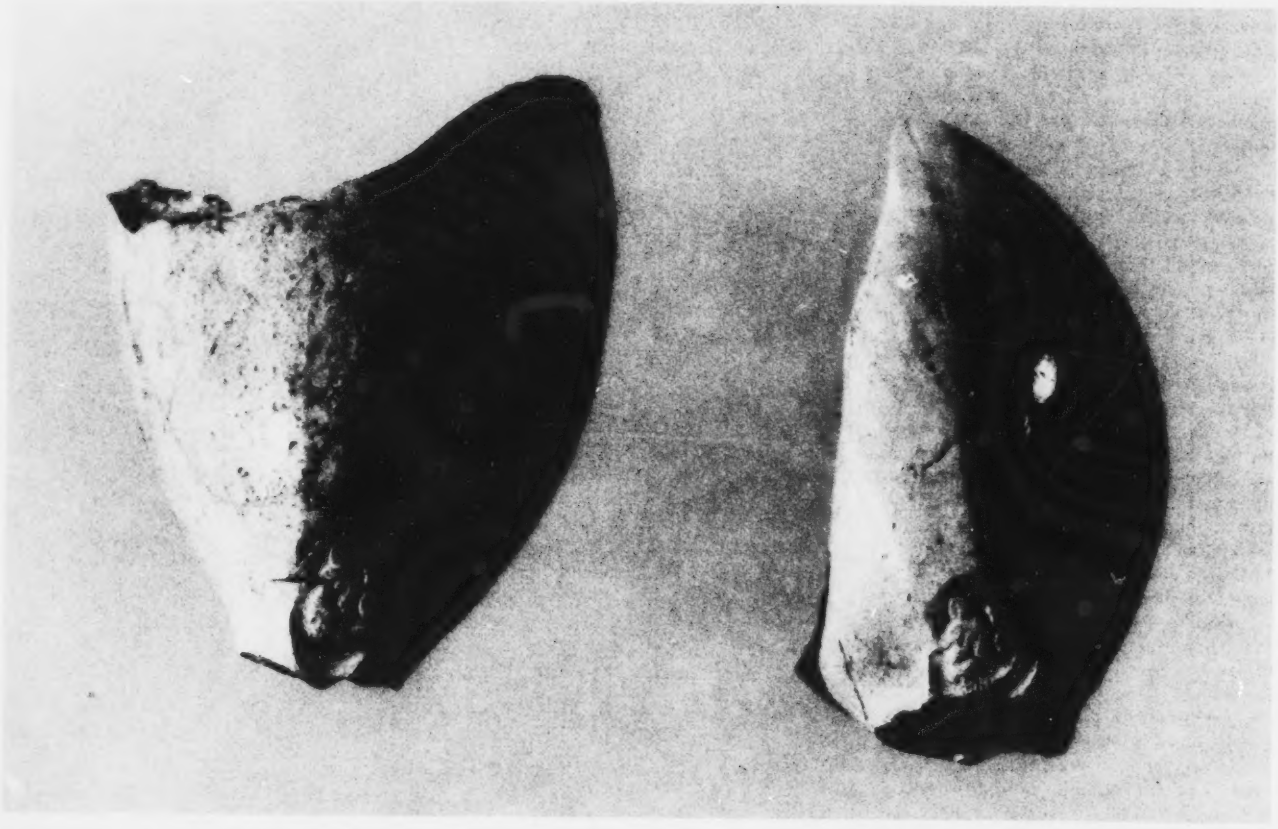
The most likely maker of these pipes appears to be Thomas Dormer, known from two addresses in London in the 1760s (Oswald 1960: 68). The date on which he received his freedom (became a licensed pipemaker) cannot be later than 1763, the earlier of the two dates mentioned, but nothing more is known of him, and no pipes of the type under discussion here are in the collection of the Guildhall Museum, London (letters from A. H. Hall, 18 March 1965 and R. Merrifield, 26 April 1965). Since he was already working in the 1760s, however, he could have been working as early as the 1750s.

The letters FS are not recorded by Oswald (1960: 91) before 1832: however, from Casemate 3 Right a bowl with heel (4L.39, no object number) was recorded and this had the letter F, crowned, on the left side of the heel (the right side was broken off), and the letters FS with the same decorative motifs and circle as that on the pipes bearing the letters TD described above. Pipes with these letters, crowned, in the same positions as in the example described above, on type 9 bowls but with no design on the bowl, came from the Bankside excavations, London (letter from R. Merrifield, Guildhall Museum, dated 26 April 1965). The use of crowns, though a typically Dutch form of marking, is common in association with initials on either side of the heel on pipes found in London covering the period from about 1690 to 1760 (Atkinson 1965: 254; 253, Fig. 6; 255, Fig. 7). The letters FS are not recorded at Gouda, though a Frans Soet, who used the Gouda arms as his mark, gained his freedom on 1 March 1737 (Helbers and Goedewaagen 1942: 170, No. 157), but the style of these pipes is certainly English and the letters must represent some unknown maker.

There are too many makers with the initials RB or RR (14 of the former between 1706 and 1766 and six of the latter between 1713 and 1774-90) to make further identification feasible (Oswald 1960: 60-1, 90). No name resembling "Dunier-" is recorded either in England or Gouda, but the name and style of marking suggest it to be Dutch or French rather than English (cf. Duhamel du Monceau 1771: 24-5, Pl. IX, Figs. 20-1, Pls. I-IV passim).

Virtually the only example of dating evidence derived from bowl shape alone comes from 32.7 (Fig. 8, right), an entire bowl and stem fragment. The relatively upright position of the bowl indicates that it is at least typologically late, verging towards Oswald's type 11 which he dates to 1780-1850. An example very similar to but smaller than the one under discussion came from Casemate 4 Right (4M.27.1) and was regarded by Omwake (1965: 26) as being late, possibly intrusive, in terms of the probable occupancy of these casemates. He dated the specimen to 1750-60, but the present writer would not be prepared to preclude the possibility of a slightly later date.

7 Two Dutch bowls with mermaid mark impressed on base of bowl. Context: both 1755-60.



	Layer 3		
17.3:	Entire bowl and heel, with crowned W on left side of heel, crowned M (?) on right, all raised.	35.1:	Bowl fragment bearing part of encircled and decorated TD facing smoker, as described previously.
17.4:	Heel and stem fragment, with crowned F on left side of heel, crowned S on right, all raised.	54.1:	Bowl fragment with heel, a crowned 14 raised from a depressed surround on the foot of the heel and the arms of Gouda raised on a projection surmounted by a raised letter S on either side of the heel.
17.5:	Stem fragment with letters $\frac{\text{OHST}}{\text{INZ}}$ and a line above, impressed, large shallow letters, widely spaced.	59.1:	Heel and stem fragment, possibly a T on left side of heel, D on right, in small raised letters.

8 Two English bowls of typologically late (in terms of Louisbourg) date – possibly 1760s and later. Context: both 1755-60.

Helbers and Goedewaagen (1942: 213) do not list owners of the crowned 14 before the 19th century, but their illustration of a portable board carrying 18th-century marks shows this mark, though uncrowned (Pl. VIII). The use of the coat of arms and the letter S point to a date later than 1740.

The pipe stem marked $\frac{\text{OHST}}{\text{INZ}}$ appears to have been made by John Stephens of Newport, who is mentioned in the Apprenticeship Rolls for 1751 (Oswald 1960: 92), although usually Stephens used much smaller, sharply impressed letters set closely together, as will be illustrated later. However, as six of Stephens' pipes with the latter form of lettering came from Casemates 13-15 Right, where the terminal date for occupation is about 1732, Stephens must have been working for at least 20 years before his only recorded date; thus the fragment here does not necessarily indicate a late date. It may, in fact, be an imitation of a genuine Stephens pipe. However, from an unknown part of the fortress, a pipe was found with the standard Stephens mark on its stem but with a bowl on which were floral decorations. Such a bowl would not usually be dated much before 1800, so there may have been a father and son of the same name, at present unrecorded. (Since this was written D. R. Atkinson [information via A. Oswald, November 1968] notes that a pipe made by John Stephens is in Southampton Museum and must be that of a local [Southampton-Portsmouth-Isle of Wight] maker of the first half of the 18th century. This would agree with the Newport mentioned, a Newport being on the Isle of Wight.)

Oswald (1960: 84) lists seven pipemakers with the initials WM between 1698 and 1775. One of these, William "Morley" of Liverpool, noted in 1767, was in fact William Morgan who gained his freedom in that year (Omwake, personal communication, 1965),

9 Stem fragment with letters OHST/INZ and a line above, impressed; perhaps an imitation of the mark of John Stephens of Newport, England, fl. 1751 (cf. Fig. 15). Context: 1755-60.

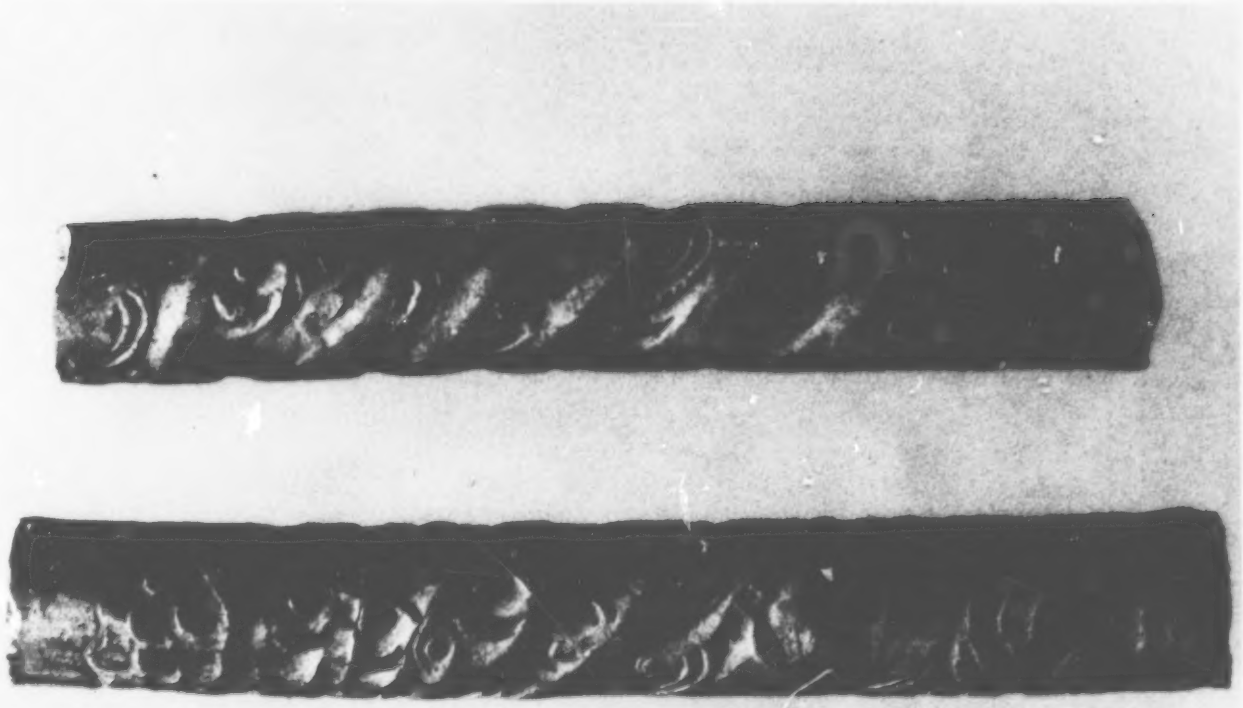
10 English bowl with lion guardant holding a halberd with a semi-circular line round and below, surmounted by a crown with G on its left and R on its right, facing the smoker, all impressed. Context: 1755-60.

and the William "Morley" noted by Oswald in Liverpool in 1803 was William Morgan (junior) who gained his freedom in 1803. A. Noël Hume (1963: 23) noted that pipes bearing these initials in various forms – on the base of heelless pipes and on either side of the heel, plain or surmounted by crowns or sunbursts – are common in Williamsburg, Virginia, in deposits usually datable to 1750-65, though they had also been found in a deposit that appeared from a Binford calculation to date to about 1740. A. Noël Hume suggested William Meakin of Chester who became a freeman in 1747. Until Liverpool eclipsed it towards the end of the 13th century, Chester was a major pipemaking centre; thus Meakin certainly seems a more likely maker than the only other known maker with these initials between 1700 and 1747, William Mellor of Bolsover, Derbyshire, apprenticed in 1723. Mellor probably catered to a very local demand in a country area.

Atkinson (1965: 253, Fig. 6; 254; 255, Fig. 7; 256) notes that among pipes found in London, the initials WM, with and without the crowns, occur on either side of the heel of pipes datable typologically from about 1690 into the second half of the century; but Oswald lists no known London makers with these initials during this period.

One fragment with these letters crowned, one on either side of the heel (4F.6.19), came from Casemate 14 Right, apparently in a 1720-32 context, but was perhaps intrusive from the fill above. From Casemate 3 Right, a bowl and heel (4L.1.7) had the letters WM, crowned, on either side of the heel; and these letters with the same decorative motifs and rouletted circle as those described on bowls with the letters TD and FS facing the smoker. From Casemate 5 Right (4N.16.4) a bowl with identical decoration to one to be described (Fig. 10) had on either side of its heel the letters W

11 Two stem fragments with identical decoration of a spiral of leaves, grape bunches, and rouletted lines. Context: both 1755-60.



and M, each crowned. The example in Figure 10 has lost its heel. The letters WM are not listed by Helbers and Goedewaagen but are illustrated, crowned, on an 18th-century portable board of pipe marks (Helbers and Goedewaagen 1942, Pl. VIII). Helbers subsequently noted (quoted by Omwake 1965, letter 5-6) that this mark, uncrowned, was in use in Gouda in 1726; that it was subsequently crowned, and that it lasted in that form until 1809. The pipes in question here, however, are certainly English.

The use of the decorative motifs above and below the letters TD, FS, and WM and their surrounding with a rouletted circle occurs with the letters WG also; and pipes bearing these last letters, like those with the letters TD, are known from camps dating to the American Revolution (Calver 1931: 92, 93). Pipes bearing the letters WM and FS in this style should therefore be broadly contemporaneous in date, and thus late in terms of Louisbourg's history. There must be some connection among these four distinctive marks, but what this is has still to be determined (cf. Walker 1966a).

Proof of the widespread popularity of the TD and TD-derived marks comes from excavations of the factory in Drammen, Norway, about 25 miles southwest of Oslo belonging to Jacob Boy, a pipemaker who was in business from 1751 to 1770. In common with other Scandinavian pipemakers he manufactured pipes in both English and Dutch styles, and one of the former was a bowl of the same shape as the TD-marked pipes described above, with the letters IB facing the smoker but otherwise identically marked, and the letters I and B on either side of the heel (Pettersen and Alsvik 1944: 53, illus. on p. 49).

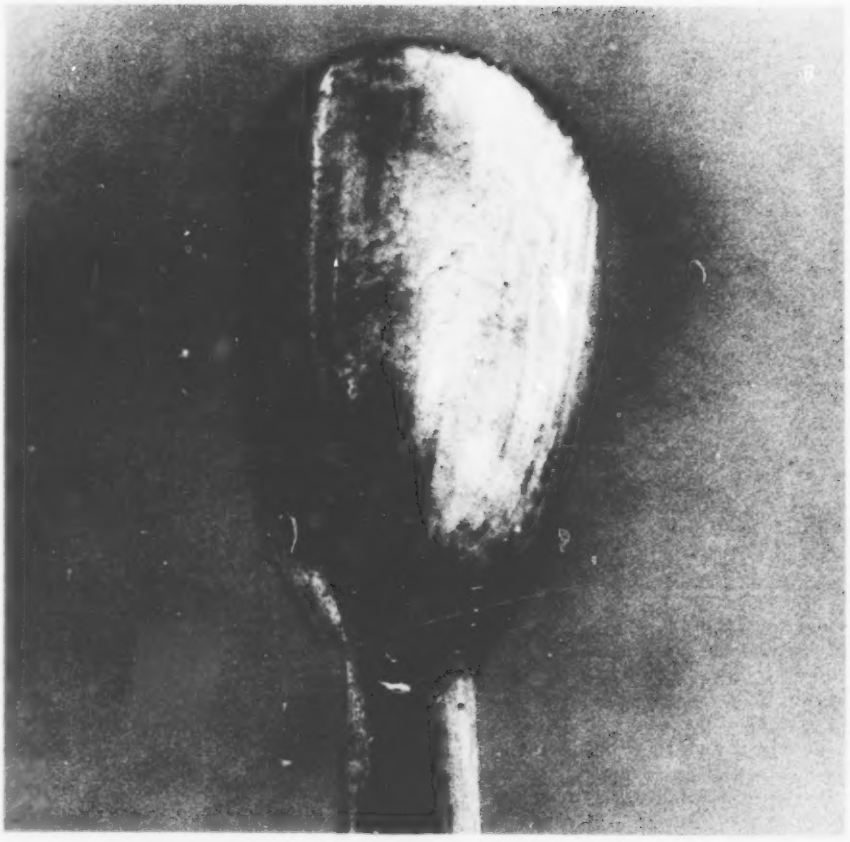
	Layer 4		
7.1:	Entire bowl and heel, crowned W on left side of heel, crowned M on right.	39.1:	Stem fragment with identical decoration to above.
7, (no object number):	Mouthpiece fragment with a *post cocturam* coating of red wax.	41.1:	Bowl fragment with heel, T on left side of heel, D on right in small raised letters.
22.2:	Bowl fragment, heel and part of stem, T on left side of heel, either ID or two half-superimposed Ds on right, in large raised letters as described above; part of an encircled and decorated TD on bowl facing smoker.	66.1:	Complete bowl, lion guardant with semicircular line around and below, surmounted by a crown with G on its left and R on its right, facing the smoker, all impressed; the beginning of a presumed heel is visible and on this is possibly part of an indecipherable mark (Fig. 10).
22.3:	Bowl fragment with figure 8 impressed on base parallel to line of stem.	66.2:	Bowl fragment, heel and stem fragment, H on left of heel, T on right.
22.15:	Heel with bowl and stem fragments, T on left side of heel, D on right in large raised letters.	75.2 and 3:	Stem fragments with identical decoration to 37.1 and 39.1 (Fig. 11).
37.1:	Stem fragment, elaborately decorated with a spiral of leaves, grape bunches, and rouletted lines.		

Material from Layer 4 is less readily datable than in Layers 3 and 2: the pieces with the letters TD point to a date approximately the same as these layers, but the heavily decorated stems are fairly closely paralleled on the one hand from a rubbish pit in Chester which contained material datable to the first three decades of the 18th century (Webster and Barton 1957: 20, 24), and on the other to material from the military site at Penetanguishene, Ontario, occupied between 1826 and 1856, which Omwake (1965, letter: 6-7; the material has not been seen by this writer) notes as being typical of the 19th century. Spence (1942: 53, 51, Pl. IV, 1) suggests that an identically decorated stem to that illustrated by Webster and Barton was made by Randle Meakin (brother of William referred to previously), who became a freeman in 1721, or by his son of the same name who became a freeman in 1784. Randle (senior) was apparently working at least as late as 1758 (Spence 1942: 64). In view of the known tendency of 18th-century Chester manufacturers to make pipes with elaborate stem decoration, it is reasonable to ascribe these three fragments to these makers. Although from the 17th century onwards, Dutch pipemakers produced pipes with decorated stems, frequently very heavily done in baroque ornament, the present writer knows of no Dutch parallels to the decoration discussed here. A stem fragment with the same decoration came from Casemate 3 Right (4C.39.93), unfortunately from unrecorded digging there in the summer of 1962.

The bowl bearing the lion guardant and crown is the one already mentioned as being identical to one with a heel bearing the letters W and M, crowned, from Casemate 5 Right (4N.16.4). (Similar bowls are known from London and one from Port Royal, Jamaica [Oswald, personal communication], but none was in a datable context, and that from Port Royal is certainly later than 1692 when much of that port was destroyed by an earthquake.) The bowl is certainly English and the letters GR presumably stand for *Georgivs Rex*, one of the three Georges, kings of Great Britain from 1714 throughout the rest of the century. It seems likely that pipes with this design were manufactured for a specific occasion, and thus may be very closely datable if the event can be determined. Unfortunately, the example from Casemate 5 Right came from an area excavated by machine and its context cannot now be known.

As already noted, letters surmounted by crowns, including the letters WM, occur from early in the 18th centry, but if we take the Williamsburg evidence that they occur normally about 1750-65 there, the obvious event to be recorded by this design would be the accession of George III in 1760. An alternative but less likely explanation could be that the design was produced as a patriotic gesture to mark the end of the War of Spanish Succession in 1748. If the maker was indeed William Meakin, then the pipe cannot be earlier than 1747, but if the occurrence of the letters W and M, some with crowns, and in a context datable to about 1740 at Williamsburg is substantiated, then Meakin cannot be responsible for these examples at least, and the patriotic gesture could have been made during the troubled times in Britain of the Jacobite rebellion of 1745-46. The bowl shape is well-developed, and while the plane of the rim of the bowl is not parallel with the line of the stem, this feature is known on TD bowls from Fort Michilimackinac, which Omwake tentatively dates to about 1755-65 (Omwake 1962: 1-2; cf. Duhamel du Monceau 1771: 4, Fig. 19). It should be dated later than 1727, when George II succeeded his father.

12 Dutch bowl with the crowned 6 mark. Single coat of arms of the city of Gouda indicates this pipe belongs to the upper classes of Gouda pipes (cf. Fig. 5). *See* p. 62. Context: 1755-60.



The initials HT belong to three known 18th-century English pipemakers (Oswald 1960: 96); Henry Turner who worked in London between 1707 and 1732, Henry Tucker of London who died in 1741, and Henry Tapplin of Easworth, Hertfordshire, who is mentioned in 1750. From this it appears that pipes bearing these initials were being manufactured all through the period of occupation of Louisbourg.

The use of the figure 8 cannot be identified. The use of numbers was another characteristic of the Dutch, but neither the style of number nor the form or quality of the fragment show any Dutch influence. Had this fragment and others like it described later come from unsealed layers, it could have been suggested that they belonged to 19th-century pipes, for by this time the use of numbers to denote styles and other information on pipes was known (Omwake 1957a: 8; Walker 1966a: 88-9).

According to Fairholt (1859: 173) and Cassidy (1895: 18), the Dutch were the first to wax the ends of their pipestems about 1700; and the English quickly followed, using either wax (usually red) or a glaze (Cooper 1907: 106), a tin glaze which turned green on firing according to Omwake (1965: 30). Omwake states that these methods appear to have been used only on the best-quality pipes, for it is recorded (Cassidy 1895: 18) that the custom of dipping the stem in ale for a few minutes before use was the practice for ordinary pipes. (The author knows of an octogenarian in England who still [1968] does this with his clay pipes.) According to Parsons (1964: 232, quoting two sources dated 1693), both glazed pipes and glazed mouthpieces were common in the 17th century, but the reference to glazed pipes seems certainly to refer to polished pipes (Houghton 1727: 205; though published in 1727, this work first appeared in 1693/94). Jewitt (1878 I: 298) extols glazed mouthpieces as one of the merits of the pipes of an Edwin Southorn, working at Broseley in the 1850s and 1860s, and implies that the custom was unusual. (It must be admitted, however, that this particular account by Jewitt is erroneous and contradictory in parts.) At Rosewell, Virginia, datable to about 1772, a few mouthpiece fragments were found with coated or glazed ends. One had a *post cocturam* red wax finish, as with the example here; another had an *ante cocturam* black slip, and others had a treacly brown glaze or a bluish green glaze flecked with light brown or orange (I. Noël Hume 1962: 221).

	Deposit containing Material from Layers 2, 3 and 4 (Intrusion 1)		
4.14:	Stem and heel fragment, T on left side of heel, D on right in small raised letters.	4.20:	Stem fragment with $\frac{OHN}{TEP}$ impressed on it (Fig. 15).
4.15:	Complete bowl and part of stem, a crowned 6 raised from a depressed surround and enclosed in an oval on base of bowl, and arms of city of Gouda similarly beside it to the left; the mouth of the bowl has a milled edge (Fig. 12).	9.2:	Complete bowl, heel and part of stem, T on left side of heel, D on right in small raised letters, encircled and decorated TD facing smoker as described previously (Fig. 16, *right*; Fig. 17, *right*).
4.16:	Bowl fragment and part of stem, EC within a circle with a motif resembling a modern trophy cup above letters and an illegible design, perhaps a heart, below, all raised (Fig. 13).	9.3:	Complete bowl with heel broken off, decoration facing smoker as described in 9.2 above.
4.17:	Heel and bowl fragment, with crowned W on left side of heel, crowned M on right, all raised.	9.4:	Bowl fragment, mermaid in oval impressed on base (Fig. 7, *right*).
4.18:	Bowl and stem fragment with figure 8 impressed on base sideways to stem (Fig. 14).	18.3:	Bowl and stem fragment bearing part of a decoration the same or similar to that already described in Layer 2, 32.5 and 32.6; part of a circle of slightly raised dots is visible and something is raised inside this.
4.19:	Bowl and stem fragment with lower part of figure 8 impressed on base transversely to stem.	18. (no object number):	Two bowl fragments with the same design as 18.3 above: in both the heart-like object inside the circle is visible.

The mermaid cipher of Gouda has already been discussed, and while it may date only from 1745, it is not possible to be certain of this.

The pipestem marked $\frac{OHN}{TEP}$, like that mentioned earlier from Layer 4, though the latter has a different style of letters, appears to have been made by John Stephens of Newport, whose only known date is 1751. He must have been in business for at least 20 years previously, however, on the evidence from Casemates 13-15 Right, as six stem fragments with his name have been found there, which dates them prior to 1732.

Pipes found in Britain with initials on the side of the bowl are restricted in distribution, though they are common in America (Oswald 1959: 59). Oswald does not list an encircled EC amongst those depictions known, chiefly from the Bristol area in England (Oswald 1961: 56). Elsewhere (1960: 63) Oswald lists only two known English pipemakers with these initials: Evans Cheever of Canterbury who became a freeman in 1741, and Elisha Clanno of Exeter working about 1780. Either of these pipemakers would agree with the late (in terms of Louisbourg) date suggested by the previous evidence, though the latter must almost certainly be too late. All the examples of these bowls from the casemate have very indistinct marks, but the decorations above and below the letters do appear to differ, or are even non-existent in certain examples. The same can be said for the pipes with this mark from Casemate 4 Right (Omwake 1965: 15-6). Proof of the varying nature of the decoration comes from two well-preserved specimens, one from Casemate 5 Right (4N.7.22) where no decoration appears save for a colon between the letters, and one from one of the basements of the Chateau St. Louis (16D.4.9) showing a rather squat, solid crown above the letters and below, a solid ace of clubs.

The crowned 6, a Gouda mark, as remarked previously, offers no definite dating evidence other than its occurrence in Layer 2 and at the contemporary site of Santa Rosa Pensacola (Omwake 1964). Similarly, the figure 8 also offers no definite dating.

	Layer 5
36.1:	Heel and stem fragment, crowned W on left side of heel, crowned M on right.
43.2:	Bowl fragment, heel and part of stem, T on left side of heel, either ID or two half-superimposed D's on right in large raised letters, encircled and decorated TD on bowl facing smoker identical to examples previously described (Fig. 16, *left;* Fig. 17, *left*). The occurrence of both these marks in the previous layers suggests this particular layer to be approximately contemporaneous with them.

	Layer 6
	No significant pipe material was recovered from this layer.
	Layer 7
24.1:	Heel and stem fragment, crowned F on left of heel, crowned S on right.
83.1:	Bowl, RT impressed on it facing the smoker, $\frac{R}{TIP}$ inside a circle, all raised, on right side of bowl (Fig. 18, *bottom right;* Fig. 19, *right*).

The occurrence of the first mark in previous layers suggests this could have been deposited approximately at the same time as the others; however, the Tippet pipe may be appreciably earlier. There was a number of Tippet pipemakers in Bristol in the latter part of the 17th century and the earlier part of the 18th, and one branch of the family comprised three generations all called Robert. Omwake (1958) and Oswald (1959) have dealt with this branch of the family. The first-named appears to be the more accurate account, and recently Omwake (1964: 20-3; and letter dated 16 March 1965: 7-8) has supplied additional material.

The first Robert Tippet became a freeman in 1660 and died between 1661 (when he took an apprentice) and 1689 (when his wife is referred to as a widow with an apprentice free that year). Presumably he was dead by about 1682, for his widow apparently had her apprentice the full seven years of legal apprenticeship, but Omwake's reasoning for 1680 is wrong – his source has a comma omitted which wrongly implies the wife had been a widow seven years in 1687. The second Robert became a freeman in 1678 and was still alive in 1713. Meanwhile, his widowed mother J(o)ane appears to have carried on her late husband's business, at least until the turn of the century, for she is recorded in 1696. (There are references in the records to both a Jane and a J(o)ane Tippet, whom Oswald [1960: 96] lists as two different persons, but Omwake [1958: 5; 1964: 22] shows that they are in fact one and the same person.) The third Robert became a freeman in 1713 and either he or his father is referred to in 1720.[2]

It is extremely difficult to differentiate pipes made by various members of this family, but the first Robert is unlikely to have been making pipes of the type 9 shape, as he died just about the time these pipes were beginning to appear. The rapidity with which this shape gained in popularity, however, is indicated by the appearance of this type with $\frac{IR}{TIP}$ in the medallion on the right side of the bowl, for this almost certainly identified pipes made by J(o)ane Tippet and thus can be dated, at the very latest, only to the earliest years of the 18th century. One of these pipes found in this casemate is described later. Omwake (1958: 12) tentatively suggested that the second Robert may have started with the impressed RT on the back of the bowl, later adding the medallion on the side, and that the third Robert may have used the medallion without the RT, in which case all those at Louisbourg of which enough evidence survives to make this assumption certain would have been made by the second Robert. Gifford (1940: 128-9, 122, Fig. 14) shows examples of Tippet pipes from Fort Ticonderoga distinctive in not having the RT on the bowl. If any one of the Robert Tippets was still working by 1755 when the fort was founded, then it would be the third, thus agreeing with Omwake's suggestion. None of the material from Fort Ticonderoga was excavated stratigraphically and it could be argued that Robert Tippet pipes found there represent some prior settlement, either Indian or European. These pipes are common on Onondaga and Oneida sites dating from before 1700 to about 1750 (Hagerty, personal communications). (Three were found, however, by the writer in the summer of 1966 while excavating the closely dated site of Fort Gaspereau, New Brunswick [1750-56], indicating that the pipes, if not the maker, were in existence as late as the 1750s. Further, two Tippet pipes were found during excavation in 1969 of a wreck in Baie-des-Chaleurs, on the Quebec-New Brunswick border, which was datable to 1760 [information from R. Grenier, National Historic Sites Service].)

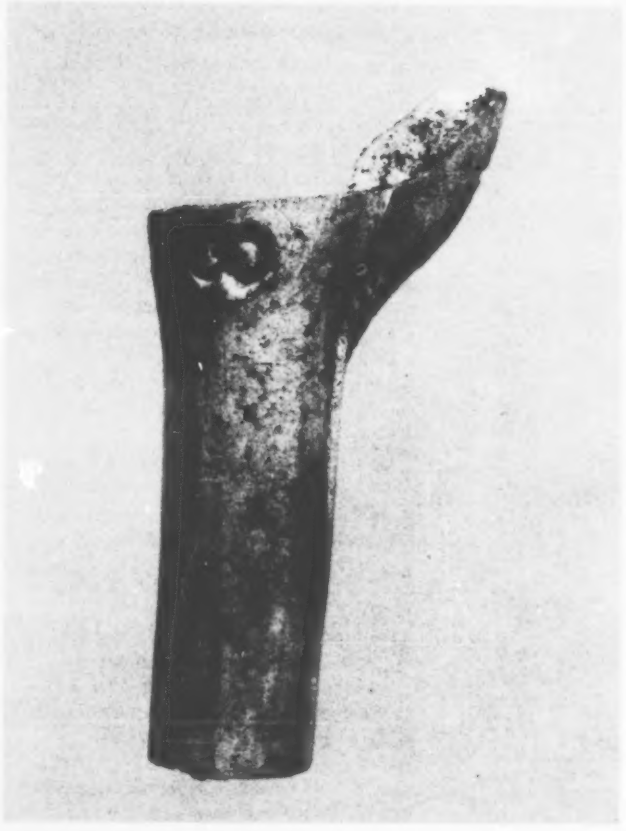
Oswald (1959: 61) notes that at one excavated kiln site in Bristol, Tippet pipes of heeled, spurred, and heelless types were found, and at another, heelless ones only, suggesting, in view of the finding in North America of the last type only, that Tippet enterprises had a large enough business to specialize in export only models. Even in today's attenuated pipe industry, the firm of C.B. and McDougall of Glasgow (Walker and Walker 1969), successors of D. McDougall Ltd. (founded in 1846, not as Fleming [1923: 243] states, 1810) had, until they closed in November, 1967, between 30

13 English pipe. EC within a circle with a motif resembling an antique urn above letters and an illegible design, perhaps a heart, below; all raised. Possibly the mark of Evans Cheever of Canterbury, fl. 1741. Context: 1755-60.

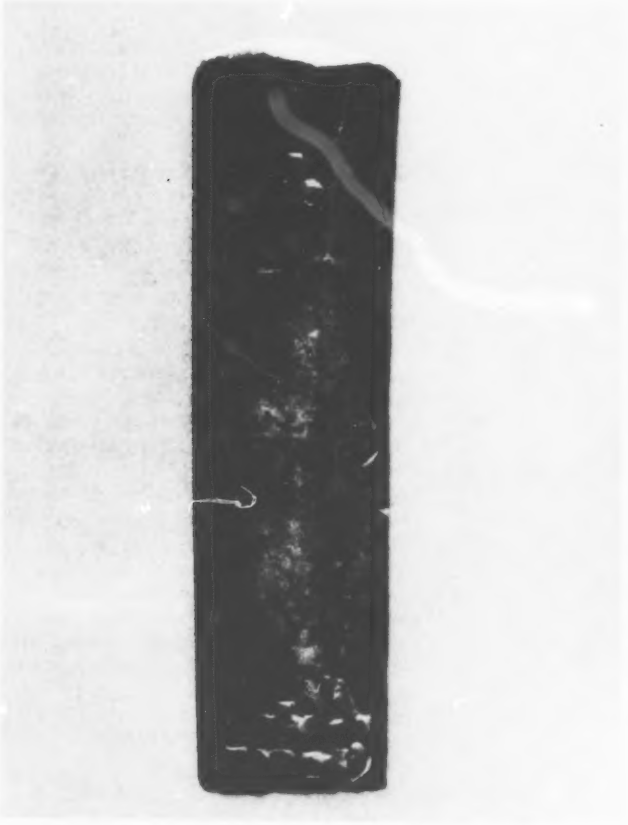
and 40 moulds in operation to satisfy different tastes in different parts of the world (Knight 1961: 34). The occurrence of Oswald's type 9 pipes so exclusively in North America may have been because of a similar predilection. Omwake (1958: 6) has suggested that Tippet pipes found in England with the RT on the bowl but not the medallion might be for the home market, and certainly all New World Tippet pipes seem to have the medallion.

	Layer 5/6/7
	In some places, because of the thinness of Layers 5, 6 and 7, it was not possible to differentiate them with certainty. The material described here represents what was found in these areas.
113.1:	Heel, bowl and stem fragment, T on left side of heel, D on right in small raised letters.
115.1:	Bowl fragment and portion of stem, fragment of circle and bottom edge of letter raised on right side of bowl, perhaps EC as below.
115.2:	Complete bowl and stem fragment, letters EC with urn-like object above but apparently nothing below (cf. deposit containing material from Intrusion 1; 4.16), encircled, all raised.
	This mixture of layers contains nothing previously unnoted in the way of dating material, and appears to be approximately contemporaneous with the previous layers. If the letters EC belong to either known pipemaker with these initials, a post-1741 date is indicated.
	Layer 8
87.3:	Stem fragment, crossed spurred pipes of Dutch type and an apparent E on its back above the bowls of the pipes, all impressed (Fig. 20).
106.1:	Bowl fragment and stem fragment, EC with urn above and indecipherable object below, all enclosed in a circle, all raised as described previously.

14 English pipe with figure 8 impressed on base at right angles to line of stem. Context: 1755-60.



15 Stem fragment with OHN/TEP impressed; John Stephens of Newport, England, fl. 1751. Context: 1755-60.



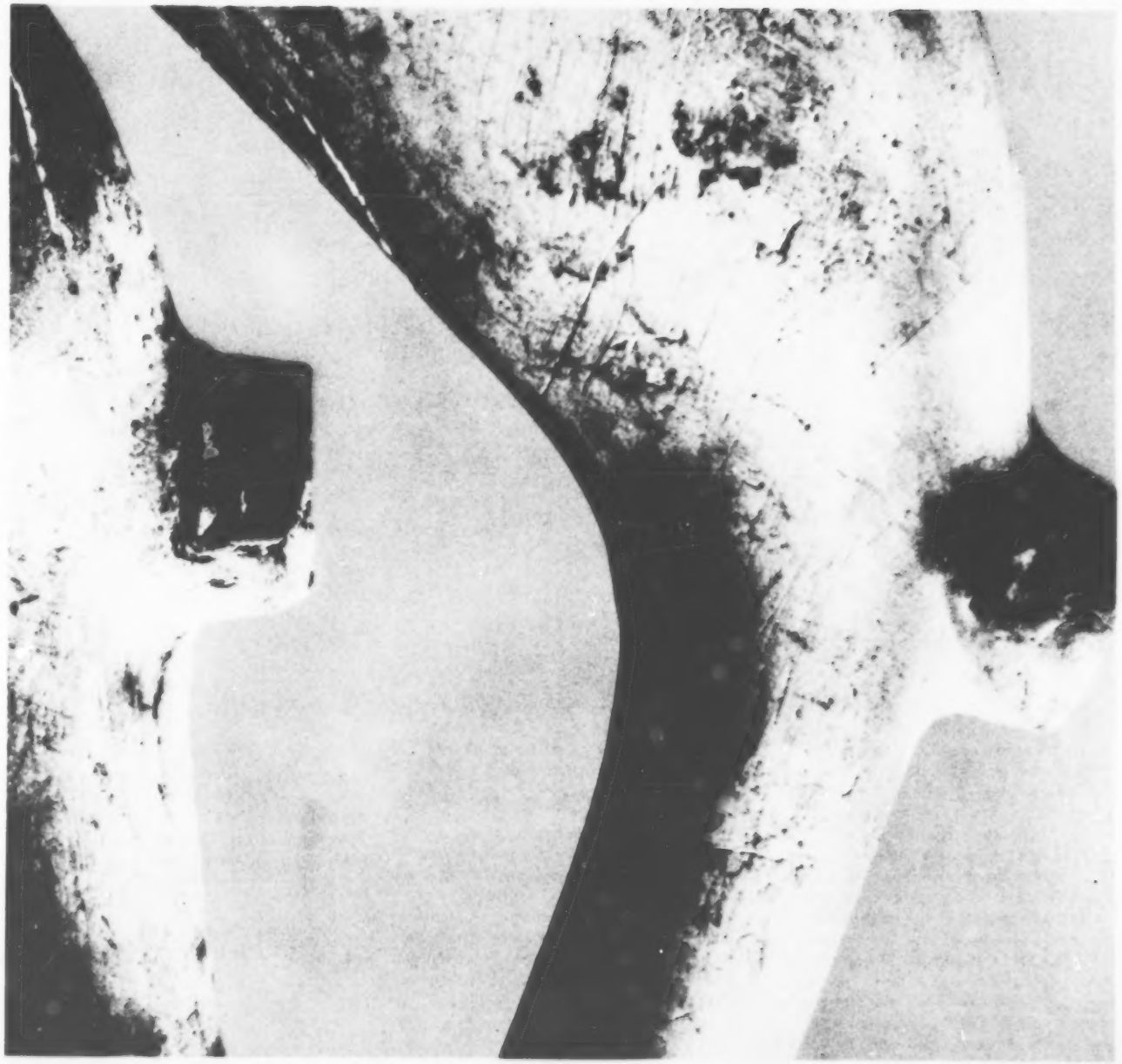
The piece with the letters EC is identical to other finds in previous layers, suggesting the approximate contemporaneity of this deposit and the other finds.

The crossed pipes, as mentioned above, are of Dutch shape, but the standard both of the decoration and the stem itself seems to fall short of the normal Dutch excellence. No definite identification can be found. It was at first thought that the decoration represented a crude and inaccurate version (perhaps forged) of the badge of the Gouda pipemakers' guild, which was two crossed pipes with their bowls up (unlike this example where the bowls face out) surmounted by a crown (Helbers and Goedewaagen 1942: Pl. I). Subsequently, however, a stem fragment (16A.1.381) bearing the same design as this stem, but with a more legible imprint, was recorded from the Chateau St. Louis. The marks above the crossed pipes are now revealed to be a name; the letters appear to read ALLT or ALLY, and above this again there are marks tentatively deciphered as IOHN, though only the O is definite. No pipemaker of a name resembling this is known either in England or The Netherlands, and the name itself does not definitely indicate its nationality. The pipes depicted on the stem, however, are certainly Dutch in shape.

From its form, one bowl from this layer, 13.3 (Fig. 8, *left*), might be construed as being relatively late. The bowl is more upright than most of those found in this area and approximates one from Layer 2 (Fig. 8, *right*), which was compared earlier with a larger but otherwise similar bowl from Casemate 4 Right, for which a 1750-60 or later date was suggested (Omwake 1965:26). This particular example (13.3) is larger than the one from Layer 2 though not as large as the example from Casemate 4 Right.

	Layer 9
73A.1:	Bowl fragment and heel, of characteristic Dutch shape and finish, with a crown surmounting what appears to be a claw hammer on base of heel; the mouth of the bowl has a milled edge.
73A.2:	Complete bowl and heel, of characteristic Dutch shape and finish, with a mark which appears to be a hollow circle surmounted by a barbell on base of heel; the mouth of the bowl has a milled edge.
73A.3:	Bowl fragment and stem fragment, ER impressed on bowl facing smoker (Fig. 21).
73A.4:	Complete bowl and heel, RT impressed on bowl facing smoker, apparently an extremely faint shield-like badge with a cross above on right side of bowl; underneath the shield is what appears to be an asymmetric inverted V, though this may be merely a nonsignificant pattern, the whole raised and enclosed in a raised circle (Fig. 18, *top*).
73A.5:	Stem fragment with complex decoration comprising a transverse band of round dots each surrounded by a circle, between double parallel lines, followed by a panel with barbell-like motifs parallel to each other and lying parallel to the stem, followed by a repetition of the barbell motif; the one end of the decoration visible on this fragment is edged with ogee impressions lying parallel to the stem (Fig. 22).
88.1:	Bowl fragment and stem fragment, a crowned 6 raised from a depressed surround in an oval on base of bowl; the mouth of the bowl has a milled edge (Fig. 23).
88.2:	Very small fragment of bowl wall with part of medallion and the letters HT inside (only right half of the letter H present) separated by a star, surmounted by a pyramid of six very small diamond-shaped dots, enclosed in a circle cog-toothed inside and out, all raised (Fig. 24, *right*).
94.1:	Bowl fragment and stem fragment, RT impressed on bowl facing smoker (Fig. 19, *left*).
94.2:	Bowl fragment and stem fragment, IR / TIP / ET in circle on right side of bowl, all raised (Fig. 18, *bottom centre*).
100.1:	Stem fragment, with letters REUB / ENSI impressed on it (Fig. 25).
100.2:	Bowl fragment and heel, W raised on left side of heel, other side obliterated.
100.3:	Heel and stem fragment, crowned F on left side of heel, crowned S on right, all raised.
103.2:	Stem fragment with half of a six-rayed star with circle in centre surrounded by two concentric circles raised from a depressed background (Fig. 24, *left*).
109.7:	Bowl fragment and heel fragment, EC very faintly marked with no embellishments visible, encircled, all raised.
121.1:	Bowl fragment and heel, crowned B raised from a depressed surround on base of heel.
121.2:	Bowl fragment and stem fragment, base of RT impressed on bowl facing smoker visible, R / TIPP / ET in circle on right of bowl, raised (Fig. 18, *bottom left*).
121.3:	Stem fragment, heel and bowl fragment, CAR / TER raised from a round-cornered, depressed square on top of stem, the name running at right angles to the stem (Fig. 26).
121.5:	Bowl fragment and stem fragment with raised encircled cartouche of R. Tippet on right side of bowl as above, but because of deposit of rust only final T of surname visible.
121.7:	Heel and stem fragment, crowned 10 raised from depressed surround on base of heel.
131.1:	Entire bowl of typical Dutch shape and finish, indecipherable mark on left side of base; the mouth of the bowl has a milled edge.

16 Two examples of English pipes with the letters TD; *left*, with double D; *right*, single. Context: *left*, 1755; *right*, 1755-60.



17 Same two examples as in Figure 16, showing typical shape of English bowl of this period; TD design on bowl and motifs below and above letters and the rouletted enclosing circle.

Pipes made by the Tippet family have already been discussed and the occurrence of five here suggests an earlier date than that deduced for the previous layers. The absence from this layer of any pipes with the letters TD, which are known to be late, and of which eleven were found in the previous layers, reinforces this suggestion.

The Tippet pipe with the badge on the side was certainly not a standard product of the family: indeed its occurrence seems completely unrecorded to date. The heel suggests it may have been intended for the English market. The pipe may have been intended to commemorate some event, in which case it may ultimately be closely datable; but attempts to identify it have so far failed. Pipes with the $\frac{IR}{TIP}{ET}$ as noted earlier, were in all probability made by J(o)ane Tippet, wife of the first Robert Tippet, who apparently carried on her dead husband's business after his death before 1682 until at least 1696. Pipes from a site discussed by Omwake and Oswald also have the surname split in the same place as this example despite coming from different moulds, and other pipes illustrated by them use either $\frac{TIPP}{ET}$ (as examples 121.2) or $\frac{TIP}{PET}$ (as in example 83.1). The $\frac{IR}{TIP}{ET}$ pipe here is clearly identical to those referred to by Omwake and Oswald; in fact, if these are made by the widow of the first Robert Tippet the example in this layer is probably the earliest pipe in the casemate, for it must

18 Four bowls manufactured by members of Tippet family of Bristol, all with RT impressed on side of bowl facing smoker. *Top*, at present apparently unique in North America, has heel and what appears to be a badge in the medallion which normally takes the Tippet name. *Bottom left* has R/TIP/ET inside medallion; *bottom centre* has IR/TIP/ET and *bottom right* R/TIP/PET indicating the use of different moulds. *Bottom centre* made by J(o)ane Tippet (*see* text). Remaining examples made by second or third Robert Tippet, or both, who between them covered the period from 1678 to after 1720. Context: *top, bottom left,* and *centre:* ca. 1716-49/50; *bottom right:* 1749/50-55.

date to the very beginning of the 18th century at the latest.

Nevertheless, the occurrence of two bowls marked EC, already noted in upper layers and discussed earlier, would suggest a much later date for the deposition of this layer if the identification of these initials is correct; and the occurrence of a pipe with the letters FS, both crowned, two other examples of which occurred in upper layers, suggests the same conclusion.

The complexly decorated stem 73A.5 appears to be Dutch in origin, for the decoration is paralleled on two stems with bowls attached from Casemates 13 Right and 14 Right (4W.3.112, Fig. 38, and 4F.6.391, Fig 44, respectively), which have on the heel a crowned LV with what appears to be a bird flying below. While this mark is not recorded by Helbers and Goedewaagen, it is typically Dutch; and the bowl shape, while not among the usual ones illustrated in Figure 27, may be a contemporary of the type with the plane of its bowl parallel to its stem which, brought to England in 1688, inspired the type 9 shape and its variants, and ultimately was responsible for the shape that came to be associated with all English clay pipes. Thus the shape itself, which appears not to have caught on in The Netherlands, implies a relatively early date in terms of Louisbourg; a supposition strengthened by its occurrence in the right face casemates which were filled about 1732.

The crowned 10 is also a Gouda mark. It is not listed by Helbers and Goedewaagen, but one of their illustrations (Pl. VIII), captioned only as 18th century, shows it.

The crowned 6, another Dutch mark, has already been referred to. However, in this case, the coat of arms of Gouda is not present and it seems probable, though not entirely certain, that this pipe dates to before 1739-40.

19 One of the bowls shown in Figure 18 and another showing RT impressed.

The crowned B, also Dutch, was originally registered in 1661. The earliest known owner, however, is a Bastiaan Overwesel who sold it on 6 November 1770 (Helbers and Goedewaagen 1942: 139).

Oswald (1960: 63-6) lists a number of Carters, but only two, or conceivably three, who could have been active during the occupation of Louisbourg: James Carter of Rye, married in 1689; Richard Carter of Bristol, freeman in 1706; and another James Carter, of Bristol, freeman in 1734. The date makes it less likely that the James Carter of Rye would have been the maker, and Rye was a tiny port in Sussex while the port of Bristol was the centre of trade to the American colonies at this time.

The style of mark on top of the stem is unusual, however. It seems unknown in Bristol and there are unfortunately no pipes identifiable with either Carter in the City Museum, Bristol (Lillico, personal communication). On the other hand, the style is known in northeast England, where it is the normal means of identification between about 1675 and 1725, though in a very much more ornate form (Parsons 1964: 245-7, Fig. 3a). Parsons does not list any makers by the name of Carter from this area. (Since the above was written a C. Carter has been identified, on the basis of excavated material, as probably a Southampton pipemaker dating to about 1720-50. His pipes have a C on either side of the heel and $\frac{\text{CAR}}{\text{TER}}$ on the stem [information from D. R. Atkinson, via Oswald, November 1968].)

The initials ER are recorded for several pipemakers in the 18th century, all occurring early: Edward Randall of London, making pipes in 1719; Edward Reed of Bristol, 1706-22; Edward Rushton of Liverpool, 1702-19; and another Edward Randall Jr., of Bristol, who became a freeman in 1699 (Oswald 1960: 88-9) and who seems to be the same as the London Randall noted above (Oswald 1960: 48).

Two pipes bearing these letters on the bowl facing the smoker, as here, came from an Indian cemetery at Kutztown, Pennsylvania, and both are of type 9c and similar in appearance to Tippet pipes (Pearce, personal communication). The cemetery contained other material all datable to the period 1700-40, and the child burial containing the pipes in question also contained a silver spoon datable to 1720-25 with crest and hallmarks from Philadelphia: Witthoft (in a letter) feels a date in the 1720s for the burial is likely.

In view of the fact that these initials are similar in form to, although larger than, the RT on the Robert Tippet pipes, there appeared to be the possibility that the maker wih the initials ER had been apprenticed to one of the Tippet family, and that on becoming a freeman, used his master's style. In this case the maker would most likely be a Bristolian. Reed was apprenticed in 1699 to William Tippet senior, perhaps a younger brother of the second Robert; though by a curious coincidence Edward Reed's brother, Thomas, was apprenticed to the second Robert Tippet in 1698 (Ralph, 1964, letter). Randall was apprenticed to John and Mary Sinderling in 1689, his father, a pipemaker, being dead by this time (Ralph, 1965, letter). At Louisbourg, in a context which cannot be closely dated, a pipe bowl (8A.3.1) was

20 Stem fragment with mark of two Dutch pipes, crossed, and what appears to be the name IOHN(?)/ALLT or ALLY above. Name not decipherable on this example but known from another fragment; all impressed. Context: 1749/50-55.

found with the letters ER almost identical in style to the RT on Robert Tippet bowls and with a medallion on the side enclosing an indecipherable name (what appears to be the letter O at the end of the middle line is all that is legible). It is tempting, and this thought is not necessarily contradicted by Oswald's identification (1961: 62, n.6) of a pipe with the letters ER facing the smoker and these letters on either side of the heel as made by the Edward Randall of London mentioned in 1719, to think that at least the pipe with the medallion was made by an apprentice of one of the Robert Tippets. According to Oswald (1960: 48), Edward Randall Jr., of Bristol was the same person as the Edward Randall working in London 20 years later; if so, the use of the initials on the bowl facing the smoker might have been inspired by the Robert Tippet pipes, even if Randall had not been apprenticed to that family. Were he later in London, Randall could have added the letters to the heels of his pipes, following what seems to have been a popular custom in the London area, as already noted (Atkinson 1965: 253-5).

The initials HT have already been discussed when dealing with a pipe fragment which has these letters on either side of its heel (Layer 4, 66.2). The right side of the bowl, as the smoker holds the pipe, was missing in this example, and as makers' medallions are almost invariably on that side, it is possible that the pipe from Layer 4 and the fragment from this layer may have been made by the same person. However, as three makers, who between them cover the period Louisbourg was occupied, are known to have had these initials, no positive identification can be given.

A pipe stem from the Chateau St. Louis (16F.2.7) reveals that the name REUB/ENSI is in fact Reuben Sidney, but no maker of this name is at present known either in England or Gouda. Presumably, however, he was English. (Since this was written, Reuben Sidney has been identifed as a Southampton pipemaker who is known to have been active 1714-16 [information from Atkinson via Oswald, November 1968].)

Helbers and Goedewaagen do not illustrate any mark resembling a claw hammer, and the uncertain mark resembling a hollow circle surmounted by a barbell has no illustrated parallels. It is certainly not the milkmaid, which is perhaps the nearest approach illustrated, nor is it the three-leaved shamrock.

The encircled, six-rayed star on the stem cannot be identified at present, though an unbroken specimen (16D.4.9) was found in the chateau.

There is one bowl from this layer, 103.1 (Fig. 28), which approaches the extremely elegant, elongated shape which is Oswald's type 9c *par excellence*. As noted earlier, all the English pipes from this casemate are basically of this type; indeed, they are universal in the New World to the exclusion of the more common type used in England (type 10) during the greater part of the 18th century. At Louisbourg, however, the slender long bowl set at a markedly obtuse angle to the stem as shown here is unusual, this example being the only one known from this casemate and one of the few seen in the Louisbourg material so far. As noted earlier, I. Noël Hume (1963: 262) shows that type 9 and its variants last throughout most of the 18th century. This example most nearly approaches a shape dated by Noël Hume to 1720-80, and it was found at Rosewell (I. Noël Hume 1962: 220-1, 232, Fig. 35, *8*) in a context dating to the third quarter of the century. In itself therefore, this bowl does not add to the dating evidence of this layer. It is interesting that this type of bowl is so rare at Louisbourg, as it suggests that wherever the source of such bowls, it was not a place that had much trade with Louisbourg, unless this particular type of pipe failed to win favour in certain areas. As will be shown below, its occurrence in this layer dates the pipe to not later than the 1740s.

Layer 10

No significant material came from this layer.

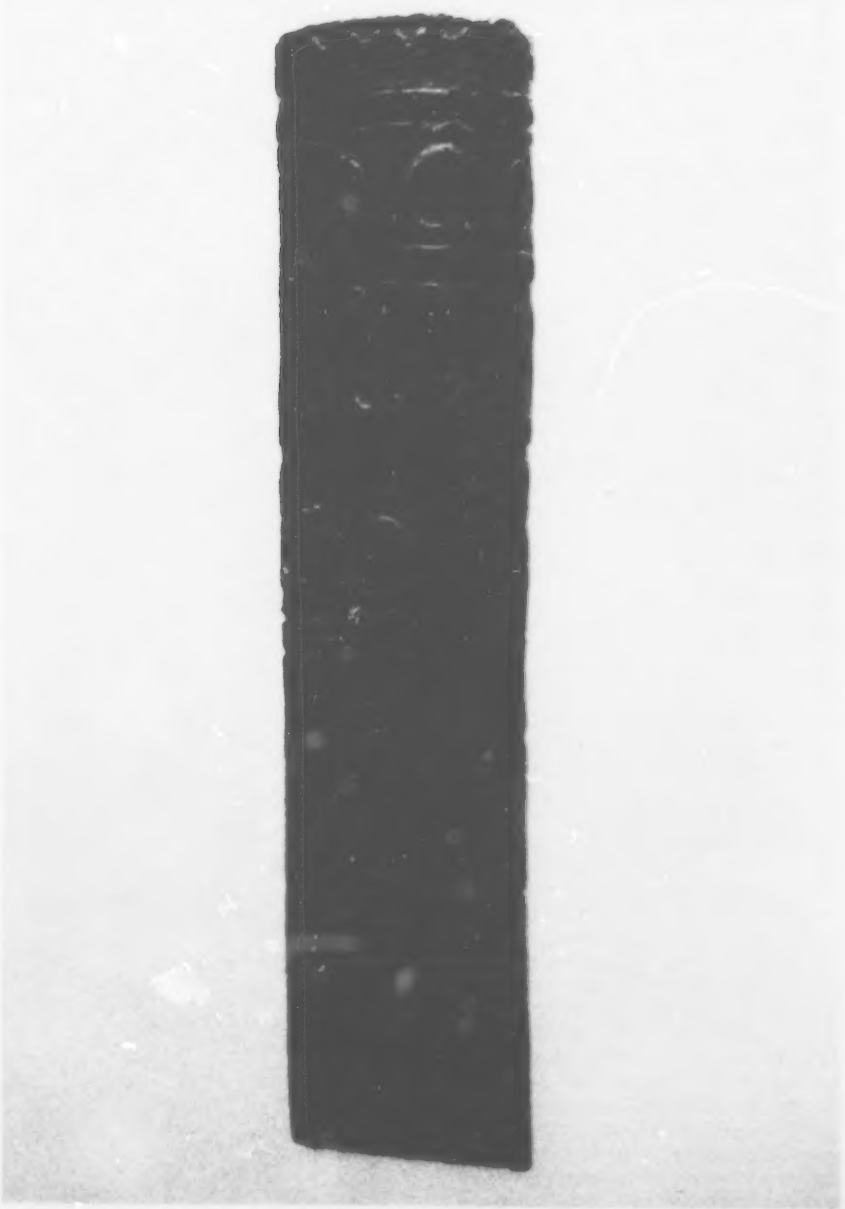
Discussion

21 Bowl fragment of English pipe with maker's initials ER on side facing smoker; probably Edward Randall, fl. 1699 to at least 1719. Context: ca. 1716-49/50.

The use of rouletted lines on stems is known in England during the second half of the 17th century. Luellin Evans of Bristol, who gained his freedom in 1661 and was still alive in 1691, used two bands on either side of his initials and a band of diamonds (Omwake 1946: 20-1; 1958: 10-11; 1963: 40-2, Pl. IIB), and identical decoration with the letters IF has also been found. As Evans was an apprentice of a James Fox of Bristol who gained his freedom in 1654 (Omwake 1957b: 6; 1962: 19), it is highly probable that the stems lettered IF belong to Fox. (Recent work on Bristol pipemakers by the writer indicates Fox was making pipes for some time before he was made a freeman, for he is noted as a pipemaker in 1651.) The fragments with rouletted decoration from the John Howland House at Rocky Nook, Kingston, Massachusetts, datable to the period 1650-80 may well have come from these two makers (Deetz 1960a: 9th page; 5th page, Fig. 1, 10; 1960b: 4).

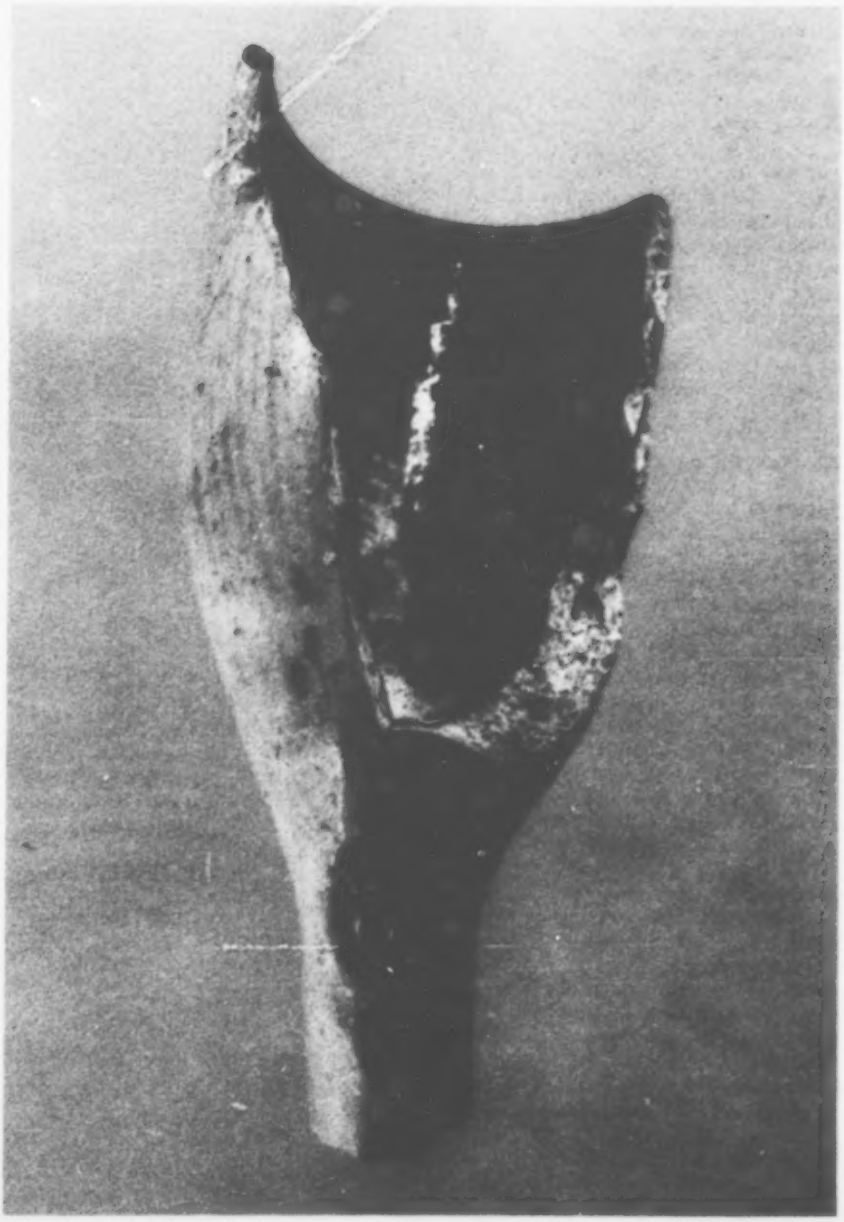
Similar if not identical decoration was used by the Dutch, however. Dunhill (1924: 222) and Brongers (1964b: 59) illustrate mid and late 17th-century Dutch pipes with this decoration, in one case combined with fleurs-de-lis; and at Fort Ticonderoga, New York, several Dutch and German stems show banding of different types around the stem, one with fairly close parallels being marked IN.GOUDA (Gifford 1940: 123, 130-1, Figs. 27-8, 36-9). Further, rouletted stem decoration occurs in the Chateau St. Louis (for example, 16C 1.344), in one case bordered with impressed triangles and occurring with a bowl bearing a Gouda mark, the crowned ES (Helbers and Goedewaagen 1942: 156; No. 134; cf. Walker 1966b: 747-8). Rouletted decoration without edging occurs on stems of bowls of the same appearance and shape but without marks (at least on the parts of the bowls that survive), and a stem has been found with rouletting bordered by PLENS at one end and GOUDA at what is probably the other end (4C.47.55). At Fort Michilimackinac (Omwake 1962: Fig. V, 17) the same decoration edged with C:D:ROOS and GOUDA occurred. This appears to have been a frequent decoration

22 Decorated stem from a Dutch pipe. Context: ca. 1716-49/50.



on pipes manufactured in Gouda, and also on those manufactured at Dunkirk (Duhamel du Monceau 1771: passim). Indeed, Duhamel du Monceau (1771: 4) says that one of the differences between "English style" and "Dutch style" pipes is that the former do not have decorated stems, although this is clearly not strictly true. A bowl of Dutch shape, unmarked, with a slightly different rouletting on the stem, edged with what appears to be a lattice pattern at one end, has come from the Chateau St. Louis (16D.3.236). Rouletting is included on an extremely baroque late 17th-century Dutch pipe probably from Gouda (Brongers 1964a: 46). Rouletting also occurs with edging similar to the circles, zig-zag lines, or triangles (cf. Fig. 30) on other Dutch stems (Douwes 1964: 365, 367). A decorated stem with these circles and triangles came from London: its suggested date was about 1660-70 (Atkinson 1965: 251, Fig. 5; 252), though the reasoning behind this suggestion is not clear. At Louisbourg, rouletted stems appear to be more common during the earlier part of its occupation, at least in this casemate and especially in the right face casemates; a fact which may be significant, for the French, who occupied the fortress between 1713 and 1745, would have been more likely to obtain pipes from the Dutch than the English. Further, the English, who occupied the fortress between 1745 and 1749 and again after 1758, certainly would not have obtained their pipes from the Dutch. Stems with the touching circles and rouletting were also found at Fort Michilimackinac (Petersen 1963: Fig. 27), occupied by the French from about 1714 to 1761 and by the English from 1761 until 1781; and some were found at Santa Rosa Pensacola (Omwake 1964: 15-6, 26), where most of the pipe material was Dutch. The latter site was occupied by the Spanish between 1722 and 1751. Examples came from a site in Ghana together with Dutch (as well as English) bowls apparently of the 17th and 18th centuries (Nunoo 1957: 16-7, Pl. III lower; additional information from the author) but no stems appear to have been found attached to bowls. An

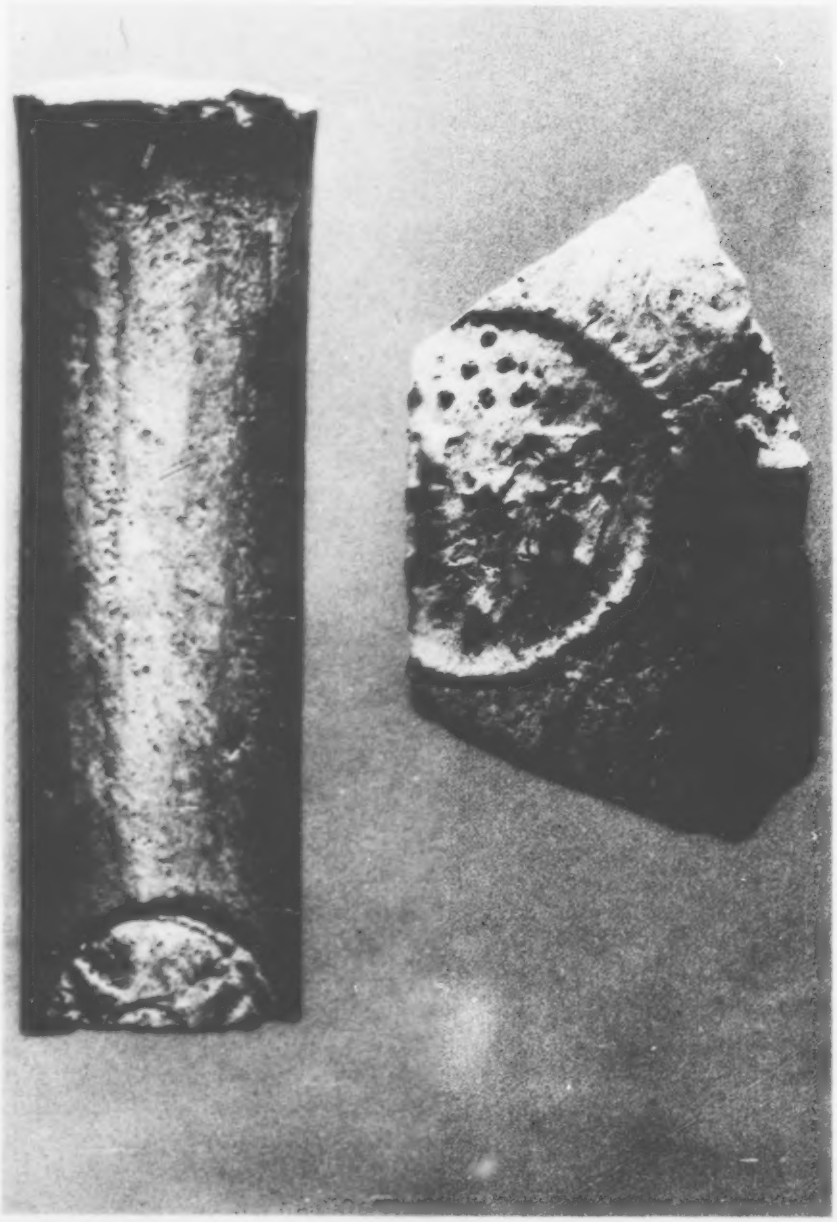
23 Dutch pipe with same mark as Figure 12 but without Gouda coat of arms and therefore probably earlier than 1739/40. Context: ca. 1716-49/50.



example found on an Eskimo site at Hopedale, Labrador, was identified as Dutch and dated to the 17th and 18th centuries (Bird 1945: 143) though unfortunately no source is given for this statement. The rouletted lines and touching circles (Fig. 29) also occur on a stem recently found in Amsterdam though not certainly Dutch (Bresnick, personal communication), and on a definitely Dutch pipe from the Pen site, New York, dating about 1685-96 (Pratt, personal communication). This latter pipe is typologically datable to the end of the 17th or the beginning of the 18th century (cf. Friederich 1964d: 4).

Hundreds of stems with the touching circles were found at the mission site of St. Francis Xavier IV, Caughnawaga, opposite Montreal, datable to 1696-1719, and Omwake (quoting in 1964: 26, 33), noting that hundreds of bowls with Bristol makers' marks were also found, suggested Bristol makers must have used such decoration. As for a French site using English pipes, he noted that French sites in Alabama and Louisiana have no Dutch pipe material but much English. Through the kindness of the excavator, Dr. Jury, and Fr. Béchard of the present St. Francis mission, however, I have been able to examine photographs of the site's pipe material (Béchard, personal communication), and while there are many English (some at least certainly Bristol-made) bowls there are also many Dutch. In addition to stems with rouletting and touching circles, there are those with rouletting edged with pendant impressed triangles. Unfortunately, no photograph showed stem fragments attached to bowl fragments large enough for identification, so that definite identification of these stems is still lacking. On previous evidence, however, it seems clear that the Dutch used both styles, whatever the English may have done. (During visits in 1969 to Belgian and Dutch museums the writer has observed not only this decoration but that of rouletted lines and impressed pendant triangles and also that of rouletted lines edged by impressed diamonds with a dot in the centre on Dutch and Dutch-style pipes, some of

24 Stem fragment with half of a rayed sun motif; bowl fragment with part of medallion with letters HT separated by a star, surmounted by a pyramid of six very small, diamond-shaped dots, and enclosed in a circle cog-toothed inside and out; all raised. Context: ca. 1716-49/50.



them certainly made in Gouda.)

In the 19th century at least, heavy ridged decoration moulded on the stem seems to have been popular among French, Dutch, and German makers, to judge from the way pipes with this type of stem made in northern France by Peter Dorni about 1850 (Omwake 1961: 12-15) were being copied at Gouda about 1880 (Sackett 1943: 77, 78, Fig. 2; Omwake 1961: 14; Fairbanks 1964: 48, 49); and at Höhr near Coblenz (Gifford 1940: 131, 123, Fig. 27), by the firm of Müllenbach and Thewald, which was founded in 1830 and ceased pipe manufacture in 1930 (Müllenbach and Thewald, personal communication).

An unresolved problem regarding pipes of the kind illustrated in Figure 30 – from Layer 9 – is their indifferent workmanship compared with other Dutch material. These pipes are certainly not English, and some of this type from other parts of Louisbourg bear marks known to have been in use at Gouda at this time. Further, the parts of the bowl that survive, as well as the style of decoration, indicate Dutch inspiration. Dutch pipes, however, are consistently of a more refined workmanship than English pipes. Figure 5 shows a Dutch pipe with the Gouda arms and the letter S on either side of the heel, indicating that it belongs to the lower classes of Gouda pipe; but in fact it is still superior in quality to English pipes. The types shown in Figure 30, however, are markedly inferior to the example of the lower classes and it is possible that they may have been either crude imitations of Gouda pipes made elsewhere in The Netherlands, or perhaps in the Pas-de-Calais area of France, or in modern Belgium whence the Dutch obtained some of their clays. The former area was where the French clay pipe industry was later very prominent (cf. Fresco-Corbu 1962: 1445; Lesur 1957-60; passim) and where pipes were already being made from early in the 18th century (Duhamel du Monceau 1771: passim; Diderot 1713-84: IV, 375; Lesur 1957-60: passim; Jakowsky 1956: 23-5). Alternatively, these pipes may simply have been shoddy goods made, rather like glass

25 Stem fragment with REUB/ENSI impressed, the mark of Reuben Sidney, hitherto unknown maker. (Now known to be from Southampton.) Context: ca. 1716-49/50.

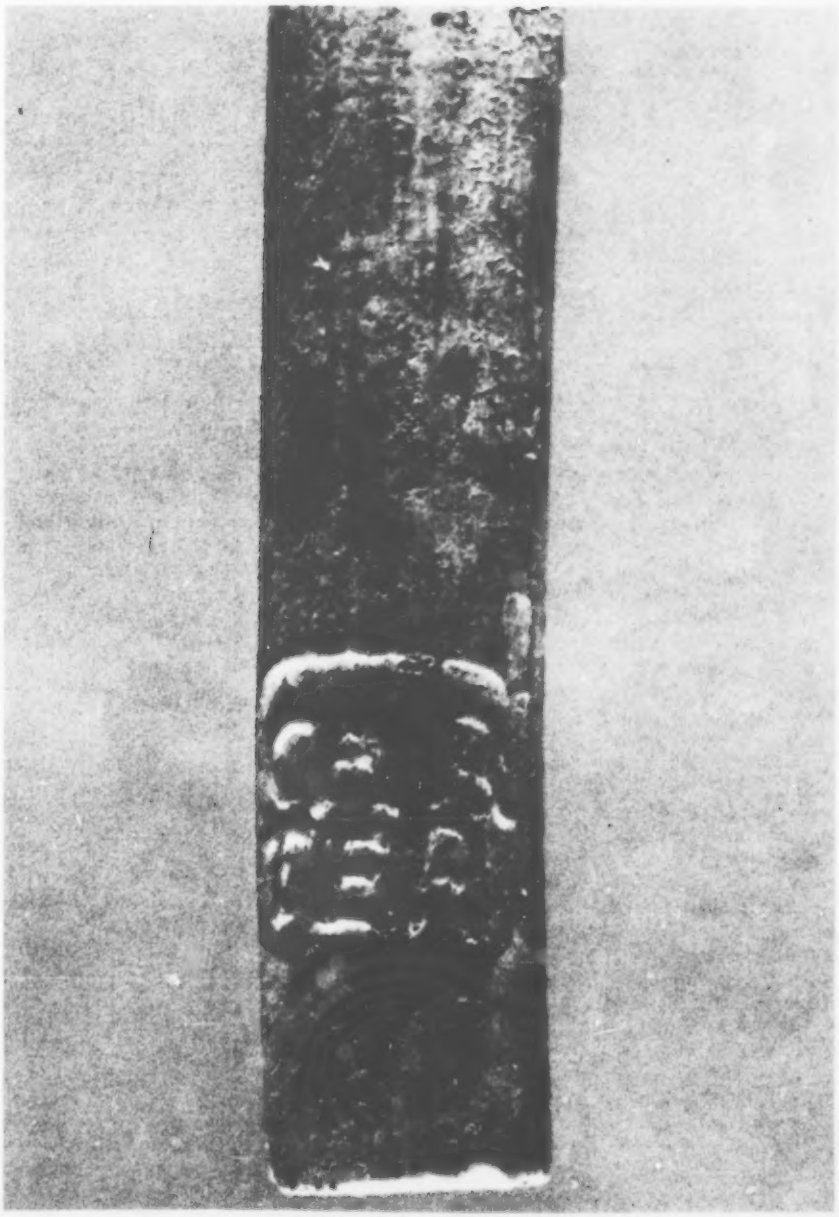
beads, especially for selling to hapless overseas buyers.

Table 1 lists the ten marks which occur in more than one layer of the casemate. Dated with relative accuracy are the first and last listed pipes, those marked TD and those made by the Robert Tippet family. The first seems to be no earlier than the mid-1750s; the latter no later than the late 1750s. Of the eleven pipes marked TD, ten came from Layer 5 and above, and the eleventh from an undifferentiated deposit of Layers 5, 6 and 7. All five Robert Tippet pipes (plus one J[o]ane Tippet pipe) came from Layer 7 and below. An initial examination of the chart suggests, therefore, a break in the history of the fill around Layer 7 (no significant pipe material came from Layer 6).

There are only two cases where similar marks are found above and below this level. A pipe with the letters FS, each crowned, came from each of Layers 2, 3, 7 and 9, and some with the encircled letters EC came from the deposit containing material from Intrusion 1, Layer 5/6/7, Layer 8 (one each), and Layer 9 (two).

Disregarding the possibility of contamination for the moment, it is quite possible, in fact probable, that the makers of the pipes bearing the marks FS and EC spanned the difference in time between the postulated two periods of fill, for only an unusual coincidence or a considerable gap in time would have two deposits so mutually exclusive as to have no pipemakers' manufacturing lifetimes overlapping. Layer 8, with only one significant mark, and that one common both in the earlier and later deposits, could be placed in either group. A firm *terminus post quem* for Layers 2 and 3 and Intrusion 1 is given by the appearance in these layers of Dutch bowls bearing the Gouda coat of arms, which dates the deposition of these layers, if not all the material in them, to post-1740. Of the other material, the TD pipes offer the best dating material, for on evidence from other sites, it is difficult to date their deposition here to earlier than the mid-1750s. The appearance of the WM marks

26 Stem fragment with CAR/TER raised from round-cornered, depresed square on top of stem. Probably a Southampton maker of first half of 18th century. Context: ca. 1716-49/50.



at Williamsburg almost exclusively in the period 1750-65 is further indication of a late dating for these layers, for this mark occurs four times. If the dating of the mermaid mark at Gouda were certain, and, more especially, if the suggested dating of the bowl with the lion guardant were correct, then it would prove that these layers were deposited late in Louisbourg's history. Indeed, the only material which specifically cannot be fitted into a 1750 and later dating is the group of ornate stems that came from Layer 4, although as their suggested maker was still alive in 1758 they need not necessarily be confined to the period in which they were found at Chester.

The evidence that Layer 9 was early comes principally from the Tippet pipes, but none of the other pipe material from this layer controverts this and some in fact supports it. None of the three Dutch pipe bowls found below Layer 7 (all from Layer 9) carry the Gouda arms. In the case of the crowned 6, this is *probably* significant, since two bowls with this mark plus the coat of arms came from the upper layers. However, the addition of the arms to a maker's mark was probably entirely permissive, and makers whose marks were not being plagiarized may not have added the coat of arms. Thus no definite significance can be attached to the absence of Gouda arms from the other two Dutch marks in this layer.

The occurrence of two bowls with the encircled EC, however, unless they represent an unknown maker, suggests that this layer was not deposited until the 1740s at the earliest, for Evans Cheever, the earlier of the two known makers with these initials, did not become a freeman until 1741. In view of the demonstrably earlier material in this layer, especially the pipe ascribed to J(o)ane Tippet, which must be dated about 40 years before Cheever gained his freedom, we must either conclude (assuming that Cheever is the maker of the pipes with the letters EC) that Layer 9 was deposited in the 1740s and comprised a great deal of much earlier refuse, or that

Table 1: Pipe Marks Occurring in More Than One Layer

Marks	Deposit containing parts of Layers 2, 3 and 4									
	Layer 2	Layer 3	Layer 4	(Intrusion 1)	Layer 5	Layer 7	Layer 5/6/7	Layer 8	Layer 9	Total
TD	1	2	3	3	1		1			11
JOHN STEPHENS		1		1						2
8			1	2						3
WM with crowns		1	1	1	1					4
Heart (?) encircled with dots	2			3						5
Mermaid	1			1						2
FS with crowns	1	1				1			1	4
EC encircled				1			1	1	2	5
crowned 6 (*with Gouda arms)	1*			1*					1	3
ROBERT TIPPET (**includes one J[O]ANE TIPPET)						1			5**	6
Totals	6	5	5	13	2	2	2	1	9	45

it was not, in reality, one deposition.

Although the fact that early clay pipes had shorter stems and wider bores than later ones had been noted previously (Calver 1931: 97), Harrington (1954) was the first to realize that this might afford a means of statistically dating otherwise uninformative stem fragments. He produced a series of charts giving the percentages of 4/64 in. to 9/64 in. bore diameters covering the 17th and 18th centuries and showing a steady reduction in average bore diameter from the beginning of the 17th century until towards the end of the 18th.

Largely because of the dating of the various sites from which the original dating material came, Harrington's figures applied to periods of between 30 and 50 years. These percentages were adapted by Binford (Maxwell and Binford 1961: 107-9; Binford 1962: 19-21) to a straight-line regression formula which resulted in an equation $Y = 1931.85 - 38.26X$, Y being the desired date, 1931.85 being the theoretical date at which the bore diameter would reach zero by this formula, 38.26 being the slope of the line (the number of years between each 1/64 in. decrease), and X being the mean bore diameter for the sample to be dated. The result is a single date, theoretically the median figure for the occupation time of the material under examination.

In view of the relatively close dating obtained from the study of the pipe material, it was decided to apply the Binford formula to the individual layers (cf. Walker 1965; 1966). A. Noël Hume (1963: 22-5) has shown that while it took a minimum of 900 to 1,000 fragments to obtain a consistently stable date (plus or minus six months or less) by the Binford method – increasing percentages were taken at random from a deposit of over 12,000 fragments – it was found that sites in Virginia which had terminal dates before about 1760 gave good results whether the number of stems was 17 or 190; while later sites, whether with 31 stems or 485, gave inaccurate results, and increased in their inaccuracy (by giving dates too early) into the 19th century. This merely confirmed in detail what both Harrington and Binford had said; namely, that their formulas broke down towards the end of the 18th century. (The effect of Dutch stems on the calculation is uncertain: Harrington [1954: third page] specifically excluded such stems as they had smaller bores, and were also shorter than English pipes of the same period, but Omwake [1957a: 2; 1965 letter: 15-6] has suggested there was no appreciable difference. However, the Binford dates for the deposits in Casemates 13-15 Right were over ten years later than the median for their occupation dates, 1720 to about 1732; and as these layers contained a large amount, perhaps as much as 50 per cent, of Dutch material, it seems likely that this explains the Binford dates for the material. If Dutch material did have narrower bores than English material of the same period, then the former would, when used in the Binford formula, give a later date.)

The following table gives the Binford dates for the layers discussed above.

Table 2: Binford Bore-Diameter Dates by Layers

Layers	Date	Number of Stems Measured
2	1752.03	150
3	1756.62	100
4	1754.71	111
5	1747.05	18
6	1748.20	5
7	1750.11	8
8	1747.44	55
9	1741.31	420
10	1729.92	3
		Total 870

In the preceding table, the bore diameters were measured with the ungrooved end of drill bits. Omwake (in a letter dated 16 March 1965: 14) noted that this is the

only accurate way of measuring the bores, as the grooved end permits a certain amount of play which allows that end to penetrate a short distance when the butt end would not. As an experiment, measurements were also taken with the grooved end and it was found that the dates obtained, even from taking the drills that fitted most comfortably, were between two and five years earlier than those obtained by using the blunt end, while the tightest fit – that is when a bit entered only part way into a stem – were between 11 and 18 years earlier than those obtained from using the blunt end. Three examples taken from the above layers are given in Table 3.

From the right face casemates, however, as will be shown in the second half of this paper, in the light of strong historical evidence and some indirect evidence from the pipes themselves, the only acceptable dates came from the tightest fit. In other words, the dates that were ten or more years earlier than those obtained by using the most accurate measuring appeared to be the correct ones, which indicates that statistical analyses per se are not always reliable.

Taking into account the evidence already produced by makers' marks, the dates obtained from using the butt end of the drill seem to give the only reasonable dates for this casemate. The marks suggested there should be a break in the occupation history in the area of Layers 7 and 8. Judging from the Binford dates, the break occurs between Layers 8 and 9, and Layers 7 and 8 belong to the same group as those above them.

The date for Layer 9 adds some evidence to the idea suggested earlier that either this layer may not have been one deposition or that it includes the redeposition of earlier material, for in view of the amount of early dating suggested by many of the marks, a rather greater difference might have been expected between its median date and those of the upper layers. No reliable inference can be drawn from the date of Layer 10, as it unfortunately yielded only three fragments.

Table 3: Comparison of Binford Dates obtained by Different Methods

Layers	Butt End	Grooved End, Loose Fit	Grooved End, Tight Fit	Number of Stems Measured
2	1752.03	1750.12	1740.17	150
5	1754.71	1750.50	1738.64	111
9	1741.31	1738.26	1730.83	420

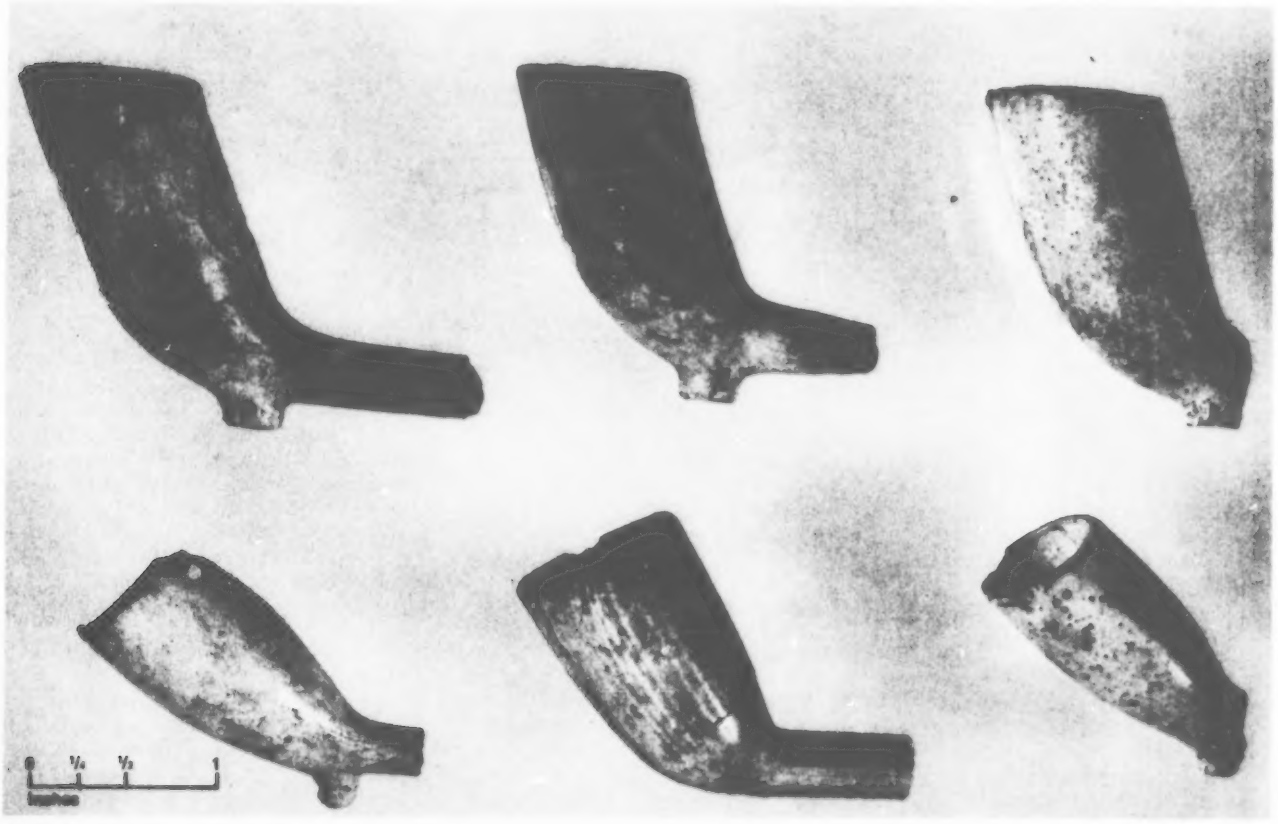
However, there is also a suggestion that Layers 2, 3 and 4 may be closer in dating to each other and a few years later than Layers 5, 6, 7 and 8 which may themselves be closely contemporaneous. This, however, can be no more than a suggestion, for the application of statistical analyses to this material is by no means foolproof, and in this case the numbers of stem fragments from Layers 5, 6, 7 and 8 are so much smaller than those from Layers 2, 3 and 4, that the chance of inaccuracy in the result is increased.

In summing up the history of the fill of this casemate as deduced from the clay pipe evidence alone – analyses of makers' marks and statistical analyses – the sequence would appear to be as follows. Layer 9 was deposited in the 1740s, possibly as a deliberate fill of rubbish from various areas, for it contains material that appears to range over a period of some 40 years. (Layer 10 is mortar detritus spill along the foot of the walls. It is separated from Layer 12 which is the same material mixed with mud, by Layer 11, which comprises mainly large pieces of wood, some of it decomposed, scattered mortar detritus and mud, but all three are clearly connected with the initial construction. However, although the Binford date agrees with this, a date from three fragments in Layer 10 cannot be accepted statistically.) The remaining layers appear to have been added in the 1750s and 1760s. The occurrence of so many marks common to these latter leaves no doubt as to their substantial contemporaneity, and the 11 TD marks in the upper layers make it difficult to date Layers 2-5 earlier than about 1755 on the present evidence. Viewing this evidence in relation to the Binford dates, it may be that these layers include earlier material, too; but if so, the range seems to be too small to be represented in a study of the makers' marks. It is possible that the upper half of these layers may be a little later than the lower half, but this is not certain. In any case, the dating evidence from the pipes in these layers precludes a difference of more than a very few years.

The possibilities of contamination of the layers may be grouped under three main headings: (1) contamination during or after excavation; (2) contamination by intrusion after the main period of occupation but before present excavation; or (3) contamination caused by redeposition of older, together with contemporary, material during the main period of occupation.

The excavations and cataloguing were carefully controlled, and contamination during and after excavation may be regarded as minimal. The second possibility is more difficult to assess: a pit was dug below the present (restored) doorway for approximately three feet out from this wall and extending halfway towards each side wall, during unrecorded work in 1962 (Intrusion 3), and its remains were visible when controlled excavation commenced in February, 1964. As excavation proceeded however, an earlier intrusion (Intrusion 2) at this end, shallower but larger than the 1962 pit which cut through it, was uncovered. This earlier intrusion, which extended the full width of the casemate, reached out about eight feet from the doorway wall. There was evidence that this had been dug earlier than the restoration work in the 1930s, but the fill included the base of a glass bottle which Gerald Stevens of the Royal Ontario Museum, Toronto, dates to about 1915 (information from D. G. Mac-

27 *Upper row:* three typical North American export-type English bowls; *lower row:* three typical Dutch bowls. Diagnostic features are the shape; larger size of English bowls; plane of rim of bowl of English pipes being parallel to line of stem; smooth glossy surface of Dutch material; and milling of edge of mouth of Dutch bowls.



Leod). It may date to the work done by Kennelly in the first decade of this century, but we have no detailed description of his work. Finally, in 1962 or 1963, virtually all the rubble, which was the back wall of the casemate collapsed inwards, was removed without recording or collection of artifacts. As noted earlier, there is little historical evidence to date the collapse of the back walls of any of these casemates, though it appears to have happened by the earlier part of the 19th century or before. In Casemate 4 Right, an intrusive pit sealed by the wall collapse contained a stem with -TON LIVERPOOL moulded on it which cannot be dated much before about 1790 at the earliest (Omwake 1965:33-4), indicating that, in this particular case at least, the rear wall collapsed sometime after that date.

The two intrusions noted at the front of Casemate 1 Right do not appear to have materially affected the pipe evidence offered in the preceding pages. The earlier intrusion cut into most, if not all, of the previously described layers; the later one certainly did, pentrating the earlier intrusion and definitely into Layer 9. This means that there were opportunities for material from one layer to fall into a lower, and for intruded material to come in contact with that of the layers under discussion. Furthermore, once the back wall had collapsed, the logical place to deposit rubbish would have been at the entrance, so any 19th-century material there would have been effectively dug into the lower fill by either intrusion. There is no specific evidence of intrusive pipe material, however, among the nearly 1,400 fragments studied; for example, none of the ornate bowls or stems with moulded names that are typical of clay pipes from about 1780 onwards.

As noted earlier, the number 6 impressed on the base of three bowl-and-stem fragments from Layer 4 and from Intrusion 1

28 Classic example of English pipe bowl of Oswald s type 9c. Context: ca. 1716-49/50.

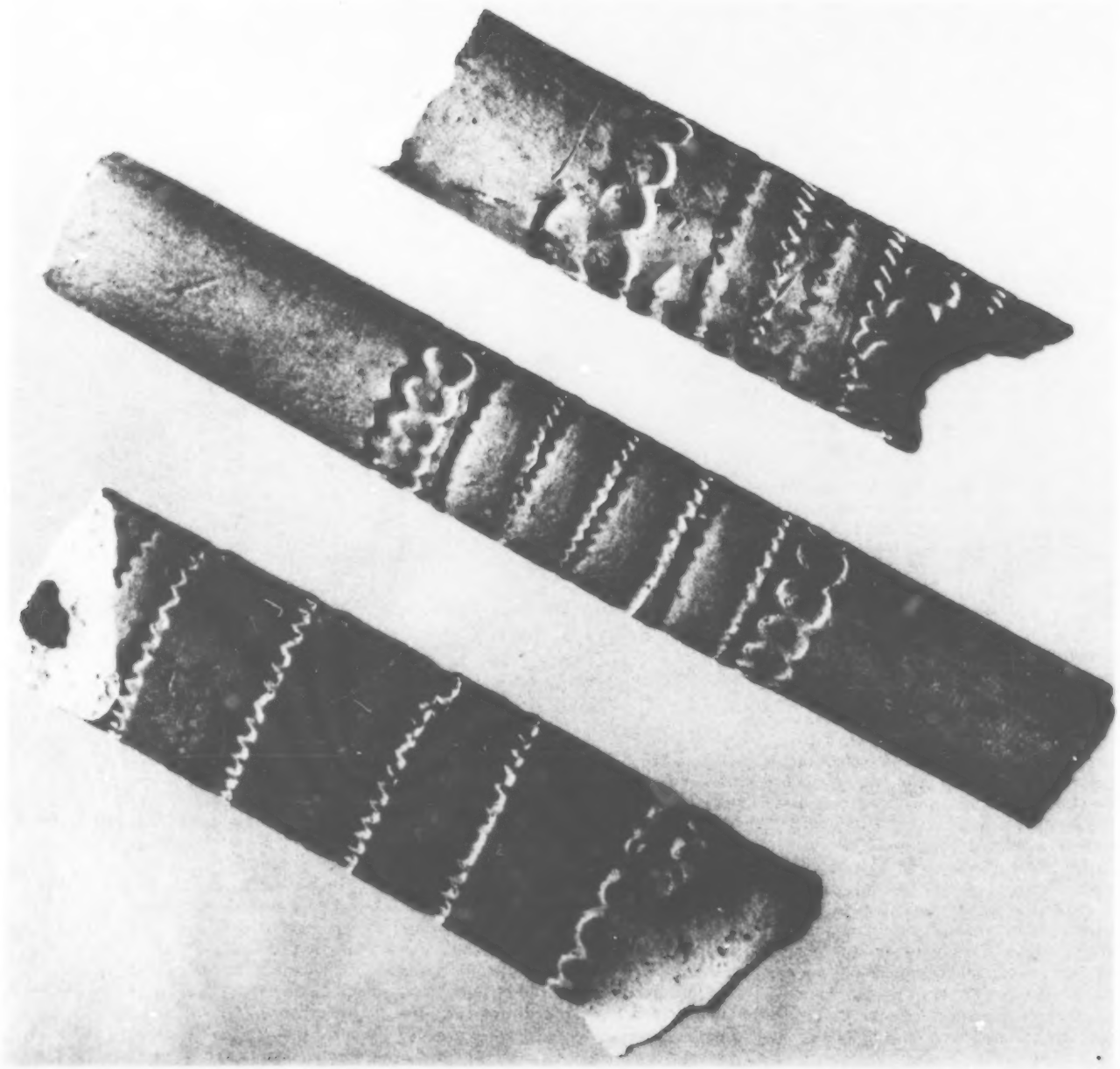
(the deposit containing parts of Layers 2, 3 and 4) has certain parallels in the 19th century, where numbers, usually moulded on the stem or on the spur, designate makers' types or styles. A similar bowl-and-stem fragment with a flat-headed figure 3 came from relatively high up in the material used to build the right face rampart over Casemate 14 Right (Fig. 46); and while the most likely explanation is that it was deposited with the material used to build the body of the rampart, the possibility of it being later or even post-French in date cannot be entirely ruled out. There is archaeological evidence, however, to be dealt with later, which places Intrusion 1 (which in any case was entirely sealed by the fall of the back wall, as it lay directly beside this wall) in an historically datable context.

The third possibility of contamination – redisposition of older together with contemporary material during the main occupation period of the fortress – can be fully discussed only with reference to other artifact evidence. However, the pipe evidence from Layer 9, covering as it does some 40 years, indicates either that this layer is of more than one deposition or that the fill used comprised rubbish from various dumps which contained material dating from the earliest French settlement. Statistical dating evidence of stem bore diameters, as already noted, suggests that the upper layers, 2 to 8, may have some redeposited pipe material in them but certainly cover a much shorter period than Layer 9. Nevertheless, the very nature of Layers 3 and 4 indicates that they comprise material redeposited from some other area, for Layer 3 contained much burnt organic material and Layer 4 was actual ash, while almost none of the artifacts from either layer indicated that they had been burned. In addition, as can be seen from the section, Layers 2 to 8, in marked contradistinction to Layer 9, lay in thin horizontal bands, one atop the other, strongly suggesting they were deliberately laid fill rather than dumped fill or the result of natural accretion.

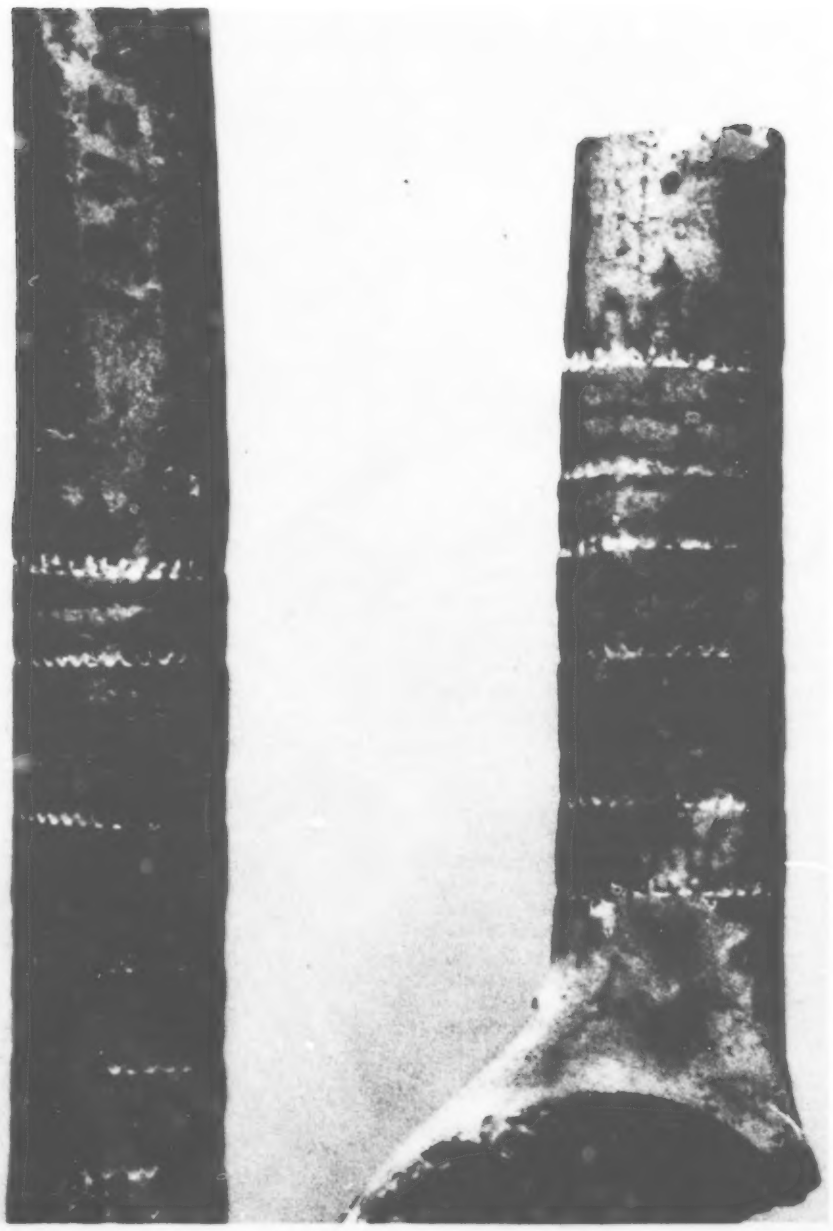
Turning to the stratigraphy of the casemate as shown in its longitudinal section (Fig. 31), the basic difference in deposition between Layer 9 and the layers above it is immediately obvious, confirming the suggestions made earlier from the pipe evidence that Layer 8 marks the beginning of quite a different period in the history of the casemate. It is also clear that Layer 9 represents a major fill of the lower half of the casemate, thus strengthening the contention that this material was rubbish and debris collected from various sources and simply dumped in. The slope of this fill indicates that it was thrown in through the doorway and progressively filled towards the rear. Historical evidence indicates that in 1749 or 1750 one casemate and part of another on the right flank were filled with refuse from the ditch of the Chateau St. Louis: Casemate 1 Right would have been a logical place for dumping, being the nearest casemate.

Subsequently, the top of this deposit (which may have reached as high as the threshold level) was removed, and a deposit of wood scraps (Layer 8) laid, apparently sloping up towards the doorway, although this vital area had been destroyed by the earlier intrusions. Why such unusual material should have been used is difficult to explain, but its occurrence over the entire

A1 Stem fragments showing rouletting and runs of circles, probably Dutch. Context: ca. 1716-40/50.



30 Stem fragments showing rouletting bordered by a line of impressed triangles, probably Dutch. Context: ca. 1716-49/50.



area and the removal of the top of Layer 9 apparently to receive it, suggests its use was deliberate. On top of this was laid a deposit of mortar detritus (Layer 7) and on top of this a wooden floor (Fig. 34). The use of mortar detritus at Louisbourg as a base for a floor is quite common, and appears to have been designed to absorb moisture. Layer 6 was composed of areas of mortar detritus apparently identical to Layer 7, but lying atop the floor. On top of this lay Layer 5, an intermittent band of mud.

At this point in the history of the casemate, the material at the back wall was cut back for approximately a foot along its entire width and depth. Sections through the right flank (Fig. 35) show that this wall had been entirely rebuilt on the base of the original and bonded to the side walls of the casemate. As this work would have been done mainly from the outside, the entire fill of this casemate had been exposed and trimmed back to facilitate reconstruction. Some work, such as pointing and the insertion of three timbers lengthwise for bracing, must have been done from inside the casemate, and Layers 6 and 5 probably represent evidence of this work, for they are thickest along the centre of the casemate, which is where one would have expected workmen to walk and bring in material for their repairs. On historical evidence this rebuilding of the entire right flank took place in 1755, so this date is a firm *terminus ante quem* for the deposition of Layers 6 and 5, and their associated floor. In fact Layers 6 and 5 were deposited in 1755. By the same means, a *terminus post quem* is given for the deposition of Layers 4, 3 and 2.

After the deposition of these three layers, however, a trench was dug through 2 and 3 and into 4 for the width of this wall. Marks in the mortar indicate that two timbers had at one time been set into the wall here and a third timber still in place was found below this level, from which it seems reasonable to deduce that this intrusion was made to remove these timbers. It is known that the English sappers who mined the defences of the fortress in 1760 encountered great difficulty in digging their tunnels because of

continuing collapse, partly caused by the unstable nature of the soil, partly because of the extremely wet summer of that year. So much timber had to be used for shoring the mines that some of the houses in the town were dismantled to provide further supplies. It is therefore quite possible that this intrusion represents the removal of the timbers here in the course of the mining in 1760. If this is so, then Layers 2, 3 and 4 must have been deposited between 1755 and 1760. What they represent is not obvious, but their regularity certainly suggests a deliberate and careful laying.

Returning to the dates given for Layers 8 and upwards by the Binford formula, it can be seen that the tentative division of these layers into a later group – Layers 2, 3, 4, 5 and 6 (1755 and later) – and a slightly earlier group – Layers 7 and 8 (pre-1755 but post-1749/50) – is substantiated by the historical and archaeological evidence.

Summary

A suggested summary of the history of Casemate 1 Right, as deduced from the clay pipe evidence, amplified by the interpretation of the archaeological sequence and dated by historical evidence, may be given as follows. Between its completion in the mid-1720s and 1749-50, the casemate seems to have remained virtually empty of refuse and other unwanted material and to have contained only a little construction debris. In 1749 or 1750, it was deliberately filled for a depth of several feet with refuse which probably was brought from the chateau ditch and which included pipe material covering a period of about 40 years. Subsequently, but by 1755, the topmost part of this fill was removed and a wooden floor, associated with Layers 8 and 7 below it, was installed. In 1755, when this floor was the open surface, the rear wall was entirely dismantled and rebuilt. Layers 6 and 5, associated with this reconstruction, are thus dated to 1755. Between 1755 and 1760, three layers of material – Layers 4, 3 and 2 – were deliberately laid over this level, and in 1760, English sappers had to cut through these three layers when they ran short of wood for shoring their mines and removed some of the timbers that had been set in the reconstructed wall five years previously. The material that partially backfilled this trench (Intrusion 1) should thus date to no later than 1760. The hollow in the top of this refilled trench was filled with the material (Layer 1) that fell on top of Layer 2 when the rear wall collapsed. Thus Layer 2 was deposited by 1760 at the latest, though if its surface remained open after the demolition crews had finished their work, material from the subsequent occupation by the English, and indeed later, could have accumulated on top of it. There is no evidence for this, however, and because the hollow left by the removal of the timbers in 1760 showed no deposit between its top and the sealing Layer 1, the rear wall may have collapsed relatively soon after 1760. In such notoriously damp and leaking structures as the casemates had always been – French and English records mention this many times – it is difficult to believe that such a hollow would not have collected water and silt.

Appendix A: Pipe Material from Disturbed Areas

The following deposits represent material from disturbed areas, the validity of whose contexts could not be guaranteed.

Layer 9M represents the initial cut made at the doorway end of the casemate before it was realized that this area had been so confused by prior depradations; Intrusion 2 is the fill found in the earlier of the two intrusions, the one containing the fragment of modern bottle.

Layer 9M

73.1: Stem fragment with OHN / STEP / HENS impressed on it, the two Ns being retrograde and the TE and HE being monogrammed (Fig. 36, *left*).

73.2: Stem fragment with REUB / ENSI and a third line half broken off below which appears to be D(P,R), N, E(F), N(M,V) impressed on it (Fig. 36, *right*).

In addition, three stems fragments (73.3; 88.no object number, and 109.no object number) have rouletted line and touching circle decoration that has been discussed in detail above.

Both of the makers' marks were found elsewhere in this casemate. There are two fragments ascribed to John Stephens of Newport, one from Layer 3, and the other from Intrusion 1. Although this stem uses the same style of lettering as that on stem fragment 4.20 from Intrusion 1, it differs in having the two Ns reversed and the TE and HE monogrammed. This suggests that either the name was put on the pipe by using dies with individual letters, which would have been extremely laborious; or a stamp was composed of a number of individual letters, which is indeed hinted at by traces of what appears to be the edge of the stamp on some Stephens stems. In view of the sophisticated pose of the monogrammed TE and HE, it is possible that the retrograde Ns are deliberate. Stem 17.5 from Layer 3, on the other hand, has much larger, more widely spaced letters, and if a die was used the letters were not sharply shaped, as in the case of the two other examples.

The fragment marked REUB/ENSI, as already noted when describing the similar example from Layer 9 (100.1), is from a hitherto unknown maker, Reuben Sidney.

A Binford analysis of the 46 fragments from this layer gave a median date of 1739.78, which compared with the similarly obtained date for Layer 9, 1741.31, suggesting that there was little difference in content between this layer and Layer 9. The reason for so designating this layer (the M standing for "mixed"), was that it comprised Layer 9 material plus Intrusion 2 material (which was itself a heterogeneous mixture including later material).

Intrusion 2

This layer represents the material in the earlier of the two intrusions. This digging probably skimmed the top of Layer 9, so if the fill of this area represents the dug material redeposited, it should comprise substantially a heterogeneous mixture of Layers 1, or at least 2, to 8; and the Binford date (1750.88) for the 71 fragments found in this deposit suggested this to be indeed the case.

16.4: Complete bowl and heel, W on left side of heel, B on right.

47.1: Stem fragment with the letters O and I and a number of indecipherable marks, impressed; large letters, widely spaced.

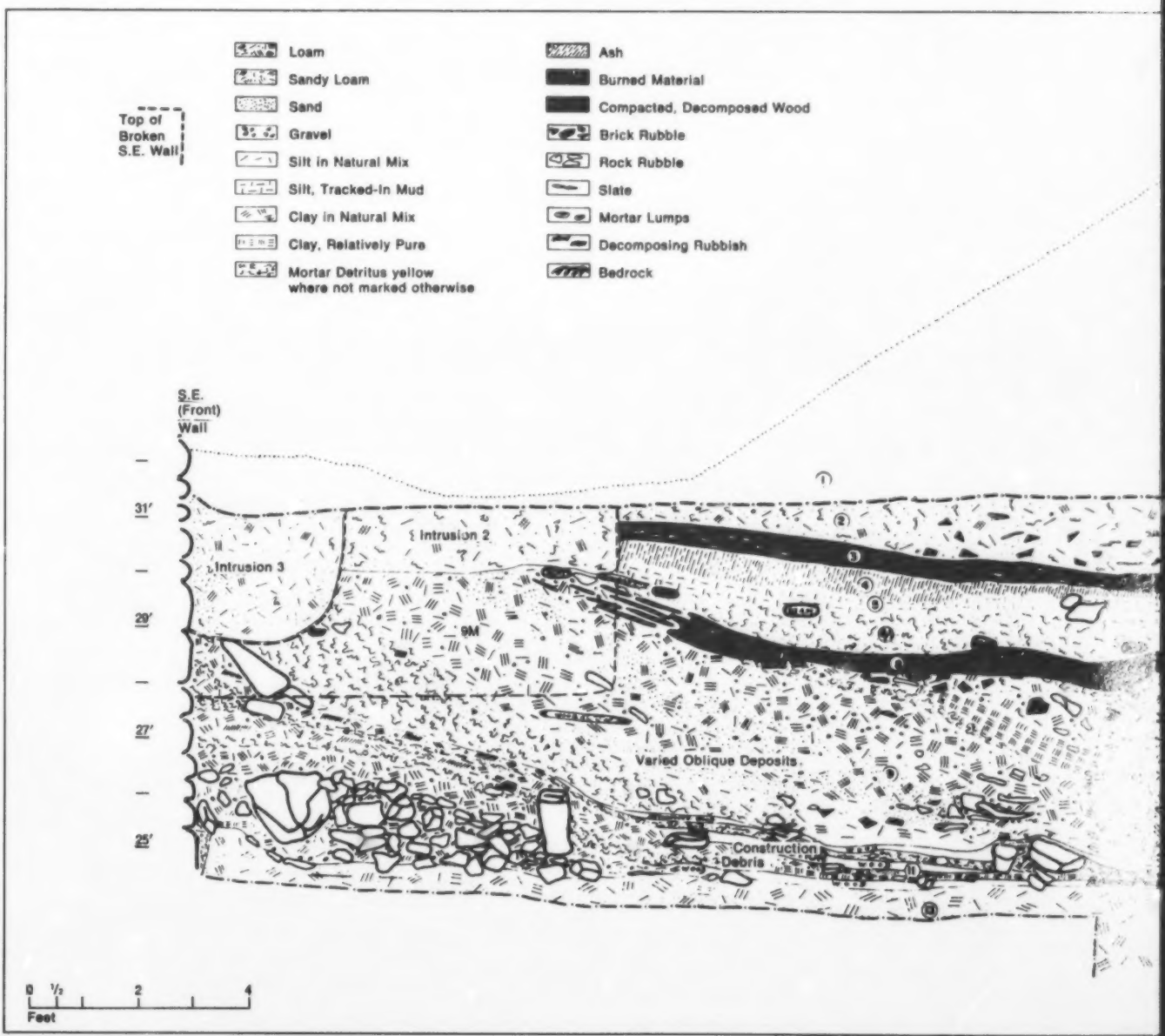
In addition, one stem fragment, 15.1, has the rouletted markings and joined circles described above.

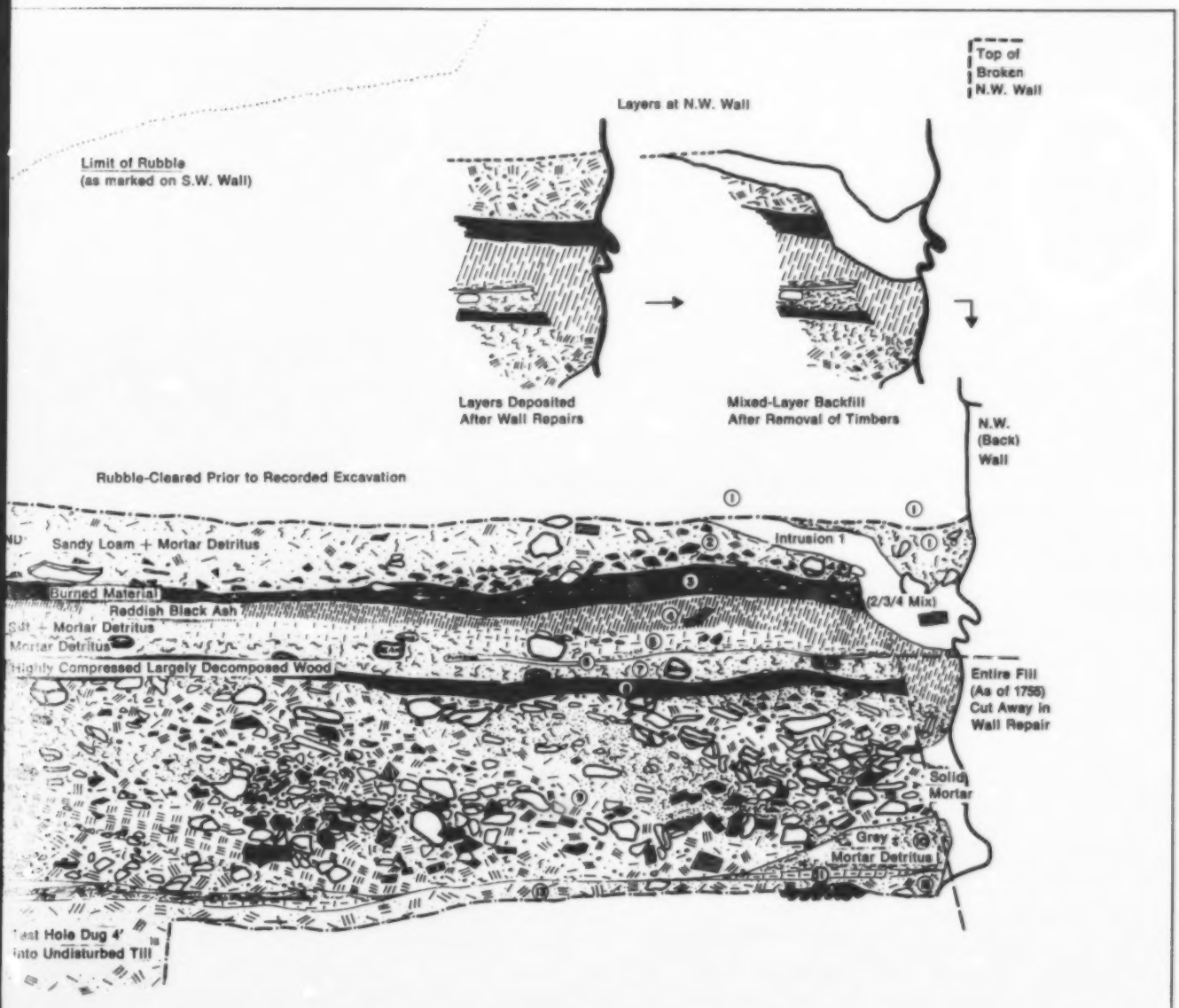
The initials WB are extremely common among English pipemakers. Between 1710 and 1759, eight are listed by Oswald (1960: 62-3): William Booth of Canterbury, freeman in 1710; William Bray of London, apprenticed in 1719; William Barnes of Woodbury, Hampshire, mentioned in 1723; William Buskin of London, mentioned in 1735; William Brion of Broseley, who died in 1740; William Bennet and William Brownbill, both of Salford and both mentioned in 1750, and William Barber of Chester, freeman in 1759. The pipe is of typical Oswald type 9 shape and is therefore extremely unlikely to have been made by Brion of Broseley, where there was a distinctive local typology (Oswald and James 1955a; 1955b). Barnes of Woodbury must have been one of the countless local makers in villages whose products rarely went beyond the immediate area; and considering the places of work of the remaining six makers, London and Chester seem the most likely, suggesting Bray, Buskin, or Barber as being the most likely makers.

The stem 47.1 is possibly the same type of John Stephens stem as that from Layer 4 referred to above, as opposed to the others which have sharply impressed small letters.

12 Recording in process during excavation. Section being drawn is upper right part of section shown on the right in the next figure.

31 Longitudinal section of Casemate 1 Right, looking NE.



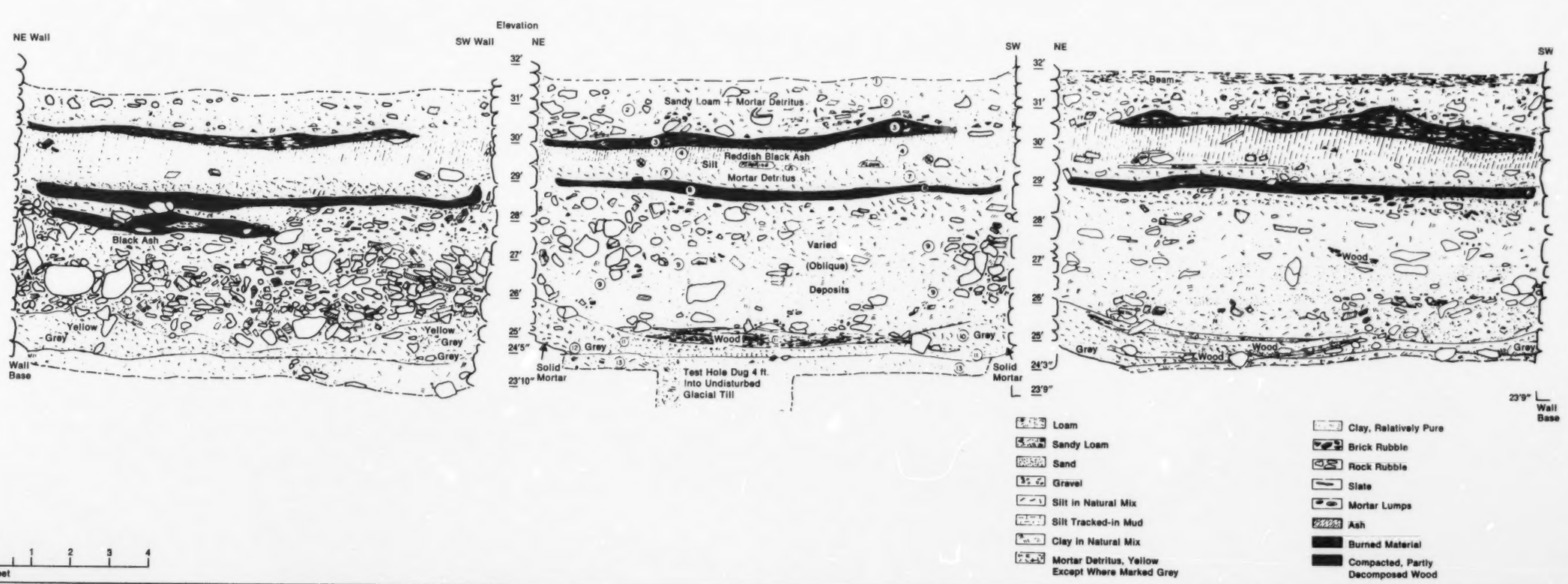

Top of
Broken
N.W. Wall
Layers at N.W. Wall
Limit of Rubble
(as marked on S.W. Wall)
Layers Deposited
After Wall Repairs
Mixed-Layer Backfill
After Removal of Timbers
N.W.
(Back)
Wall
Rubble-Cleared Prior to Recorded Excavation
Sandy Loam + Mortar Detritus
Intrusion 1
Burned Material
Reddish Black Ash
(2/3/4 Mix)
Mortar Detritus
Highly Compressed Largely Decomposed Wood
Entire Fill
(As of 1755)
Cut Away in
Wall Repair
Solid
Mortar
Grey
Mortar Detritus
Undisturbed Till

Three cross-sections of Casemate 1 Right facing NE. *Left*, taken one-third distance from rear of casemate; *middle*, taken at centre; *right*, taken one-third of distance from front.

Back ⅓
11′ From Back Wall, 23′ From Front

Centre
17′ From Back and Front Walls

Front ⅓
23′ From Back Wall, 11′ From Front

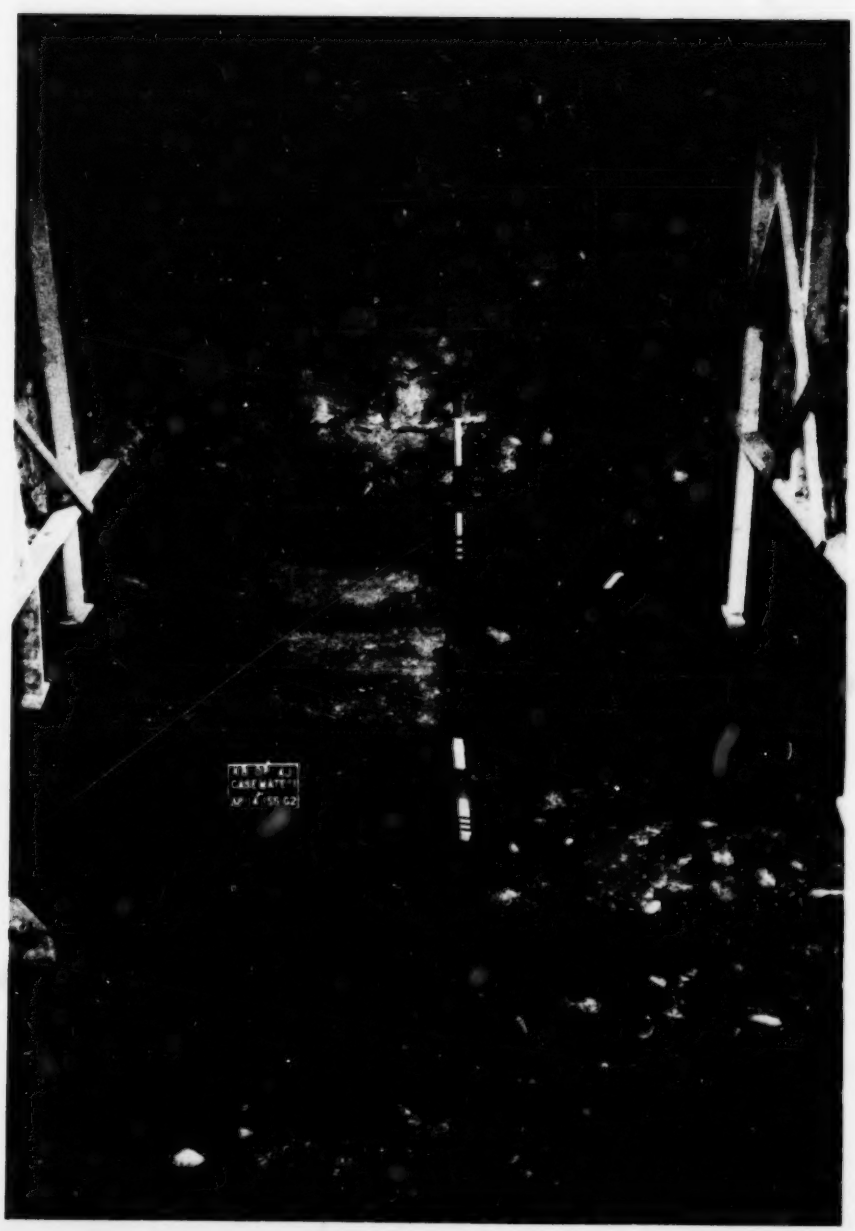


Part II Casemates 10-15 Right

34 Remains of wooden floor, looking NW.

As noted in Part I, a change in policy regarding the number of casemates to be built in the King's Bastion resulted in Casemates 10-15 Right, in the right face of the bastion (Fig. 3), being left in an unfinished state for a number of years. Eventually it was decided not to proceed with the construction of these casemates, and about 1732 they were filled and became part of the body of the rampart (Fig. 37). However, during the period 1720-32, at least some of these casemates were temporarily roofed and incidentally used as repositories for rubbish. The artifact evidence suggests Casemates 13, 14 and 15 were used for this purpose. The occupation layers in these three casemates (one in each) yielded 1,211 (approximately 95 per cent) of the 1,263 fragments with measurable bore diameters found in all six casemates, and it is on the pipe material of these occupation layers that this study is based.

Casemates 10 Right to 15 Right were designated 4T to 4Y, respectively; 4F was used to designate an earlier excavation which included part of Casemate 14 Right.



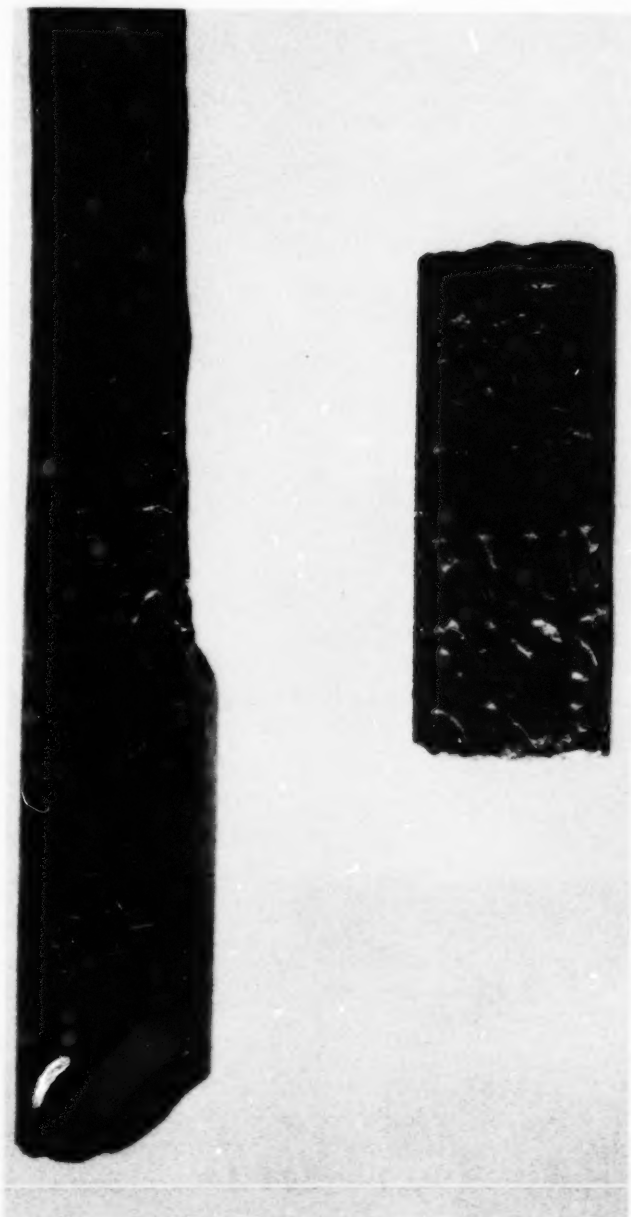
	Casemate 13 Right
4W.3.112:	Stem fragment and heel with the letters LV with a crown above and what appears to be flying bird below raised from a deeply impressed circle on the heel; identical decoration on the stem to that described on stem 73A.5 from Layer 9, Casemate 1 Right (Fig. 38).
4W.3.113:	Stem fragment with identical decoration to that on the stem above.
4W.3.140:	Stem fragment with the letters OHN impressed.
4W.3.147:	Stem fragment with parts of the barbell-like motif of the two stems described above, but with the letters IHN (the I being dubious) in this band of decoration.
4W.3.152:	Stem fragment with what appears to be the letters HEN impressed with part of an encircling ring beneath.
4W.3.155:	Stem fragment with the letters IOHN STEP HENS impressed, the two letters N being retrograde and the TE and HE being monogrammed (Fig. 39).
4W.3.185:	Stem fragment with remains of possible red paint, perhaps the coating for the mouthpiece. Stem fragments 4W.3.5 (Fig. 40, *second from left*), 4W.3.105, 4W.3.109, 4W.3.111, 4W.3.157, 4W.3.166, and 4W.3.175 all have bands of touching circles and rouletted decoration.
	Casemate 14 Right
4X.1.260:	Bowl fragment, heel and stem fragment, probably with the mark described in 4X.1.380, below.
4X.1.261:	Heel fragment and stem fragment, with trumpeter raised from impressed circle on heel (Fig. 41, *right*).
4X.1.264:	Bowl fragment and heel with identical decoration to the previous fragment (Fig. 41, *left*).
4X.1.266:	Bowl fragment and heel with identical decoration to the previous fragment.
4X.1.380:	Bowl fragment, heel and stem fragment with what appears to be the letters CVC monogrammed, the second C being retrograde, raised on heel.
4F.6.19:	Bowl fragment, heel and stem fragment, the letters W on one side of the heel and M on the other, each crowned.
4F.6.44:	Bowl with mermaid raised from impressed oval; the mouth of the bowl has a milled edge.
4F.6.56:	Stem fragment with the letters IOHN STEP HENS impressed, the H and E being monogrammed (Fig. 42).
4F.6.126:	Bowl fragment, heel and stem fragment with identical decoration to 4X.1.380 (Fig. 43, *centre*).
4F.6.190:	Bowl fragment, heel and stem fragment with identical decoration to the previous fragment.
4F.6.221:	Bowl fragment, heel and stem fragment with identical decoration to the previous fragment.
4F.6.381:	Bowl fragment and heel with identical decoration to 4X.1.261 and others above.
4F.6.387:*	Bowl fragment, heel and stem fragment with identical decoration to 4X.1.380 and others above (Fig. 43).
4F.6.387:*	Bowl fragment, heel and stem fragment with identical decoration to the previous fragment (Fig. 43).
4F.6.389:	Bowl fragment and heel fragment with identical decoration to 4X.1.261 above.
4F.6.391:	Bowl fragment, heel and stem fragment with identical mark and stem decoration to 4W.3.112, Casemate 13 Right described above and in Figure 38 (Fig. 44). Stem fragments 4X.1.56 (Fig. 40, *extreme right*), 4X.1.172, 4X.1.332, 4X.1.344, 4X.1.345, 4X.1.346 (Fig. 40, *second from right*), 4X.1.369, 4X.1.370, 4X.1.381, 4X.1.382, 4F.6.10, 4F.6.12, 4F.6.13, 4F.6.25, 4F.6.27 (two similar fragments with this number), 4F.6.28, 4F.6.44, 4F.6.50, 4F.6.77, 4F.6.86, 4F.6.99, 4F.6.119, 4F.6.146, 4F.6.163, 4F.6.197, 4F.6.203, 4F.6.222 and 4F.6.369 all have bands of touching circles and rouletted decoration.

*Two fragments with the same object number.

35 Junction of escarp wall rebuilt in 1755 *(left)* and original side walls of casemate. Scale in six-inch intervals.

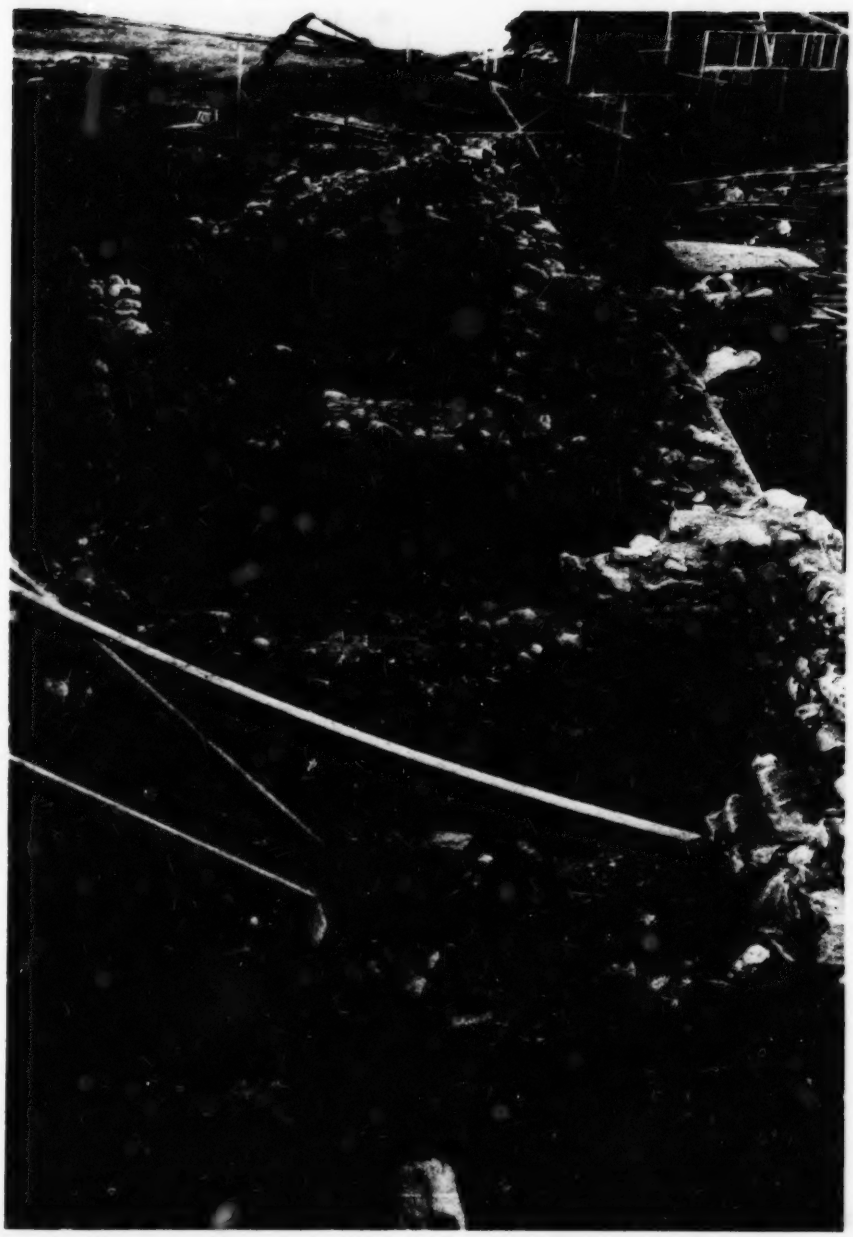
	Casemate 15 Right
4Y.1.5:	Stem fragment with the beginning of a continuous spiral fluting, the top of the ridge being decorated with a rouletted line; unspiralled part of the stem covered with a very disfigured, lattice-like pattern of impressed diamonds (Fig. 40, *extreme left*).
4Y.1.6:	Bowl fragment and heel, with bottom part of the LV mark described in Casemate 13 Right, 4W.3.112 above, on heel, the rest of the stamp having missed.
4Y.1.7:	Stem fragment with the ogee impressions that are part of the decoration of the stem of the pipe with the LV mark referred to above (4W.3.112).
4Y.1.11:	Stem fragment with the ogee impressions, the circular dots surrounded by a circle between parallel lines followed by a panel with barbell motifs that are part of the pipe with the LV mark referred to above; in this case, however, the two halves of the barbell-like motif are not individually paired and it can be seen that they are in fact formed by two lines of the ogee impressions laid back to back (Fig. 40, *centre*).
4Y.1.12:	Stem fragment with the letters IOHN, the N being retrograde, impressed on it.
4Y.1.13:	Bowl fragment and stem fragment, RT impressed on bowl facing smoker, very vague, raised, encircled cartouche with what appears to be the letter I but is probably the vertical of the R on the top line and with the T and P of the middle line of the $\frac{(I?)R}{TIP(P?)}{(P?)ET}$ in it (Fig. 45, *left*).
4Y.1.14:	Bowl fragment and stem fragment, RT impressed on bowl facing smoker (Fig. 45, *right*).
4Y.1.26:	Stem fragment with the letters $\frac{ST}{E}$ impressed on it.
4Y.1.27:	Bowl fragment and stem fragment, RT impressed on bowl facing smoker, small piece of raised encircled cartouche visible (Fig. 45, *centre*).
4Y.1.261:	Bowl fragment and heel with trumpeter raised from impressed circle on heel.
4Y.1.264:	Bowl fragment and heel with identical decoration to the previous fragment.

36 *Left*, stem fragment with OHN/STEP/HENS impressed, the two Ns being retrograde and the TE and HE being monogrammed; *see* Figure 15; *right*, stem fragment with REUB/ENSI and a third line half broken off below (*see* Fig. 25). Contexts: both disturbed, ca. 1716-60.



4Y.1.380:	Bowl fragment, heel and stem fragment with what appears to be the letters CVC monogrammed, the second C being retrograde, raised on heel. Stem fragments 4Y.1.3, 4Y.1.4, 4Y.1.6 (another fragment with this number described above), 4Y.1.9, 4Y.1.10, 4Y.1.21, 4Y.1.22, 4Y.1.23, 4Y.1.24, 4Y.1.25, 4Y.1.28, 4Y.1.56, 4Y.1.332, 4Y.1.345, 4Y.1.346, 4Y.1.369, 4Y.1.370, and 4Y.1.381 (two similar fragments with this number) all have bands of touching circles and rouletted decoration. **Other Material** The occupation layer in each of Casemates 13, 14, and 15 Right, as already noted, comprised over 95 per cent of the total pipe material from all three casemates. Of the remaining 52 fragments which came either from Casemates 10-12 Right or the post-occupation fill of Casemates 13-15, only two bore marks.
4F.4.57A:	Stem fragment and bottom of bowl, with a flat-headed number 3 impressed on the bottom of the bowl (Fig. 46).
4T.9.4:	Bowl fragment and heel, with indecipherable letters on either side of heel. The use of numbers on pipes has already been referred to in discussing the three pipes from Casemate 1 Right that have the figure 8 on the bottom of the bowl. As with those three, not enough of the bowl of 4F.4.57A remains to indicate its shape, but again it is not Dutch. This stem was found in the fill of the rampart relatively high above the occupation level in Casemate 15 Right. It could belong to the period of construction of this part of the rampart, in which case it would be virtually contemporary with the rest of the material; or it could have come during the English demolition in 1760 when mines were dug in the ramparts. Alternatively, the stem could have been a later intrusion at some time during the nearly 200 years in which some minor occupation in the fortress area continued. If it belongs to the same family of pipes as those from Casemate 1 Right with the number 8 stamped in the same position, however, it has a good chance of being dated to the middle of the 18th century, on the evidence of Casemate 1 Right.

37 Remains of unfinished right face casemates after excavation of rampart, looking N.



Casemate 13 Right

The only three marks from Casemate 13 Right which can be identified are the fragments marked John Stephens. As noted when discussing the material from Casemate 1 Right, this appears to be John Stephens of Newport, mentioned in 1751. In Casemate I Right, the two Stephens-marked fragments were datable to 1755-60, although one was also found in Layer 9M which contained a good deal of markedly earlier material (ca. 1700-1749/50). The one under discussion here has the sharply impressed letters.

In the case of the examples under discussion and the three others from Casemates 14 Right and 15 Right, we have to assume that Stephens was working over 20 years prior to the only recorded mention of him. There is only one John Stephens recorded in England, but as noted in discussing Casemate 1 Right, the occurrence of his name on a pipe with a bowl datable to the end of the 18th century at the earliest suggests there may have been two, presumably father and son, in business. The occurrence of the same mark on the one hand in a 1755-60 context in Casemate 1 Right and, on the other hand, in three casemates with a *terminus ante quem* of about 1732, clearly indicates a long period of activity, for six such marks from these three right face casemates cannot be explained as strays. Stephens is mentioned in the Apprenticeship Rolls for 1751, apparently as a master, not an apprentice.

The heel mark of the crowned letters LV and the apparent flying bird beneath are typically Dutch, but the mark is not listed by Helbers and Goedewaagen. (The initials are not, incidentally, in Oswald's list of English makers.)

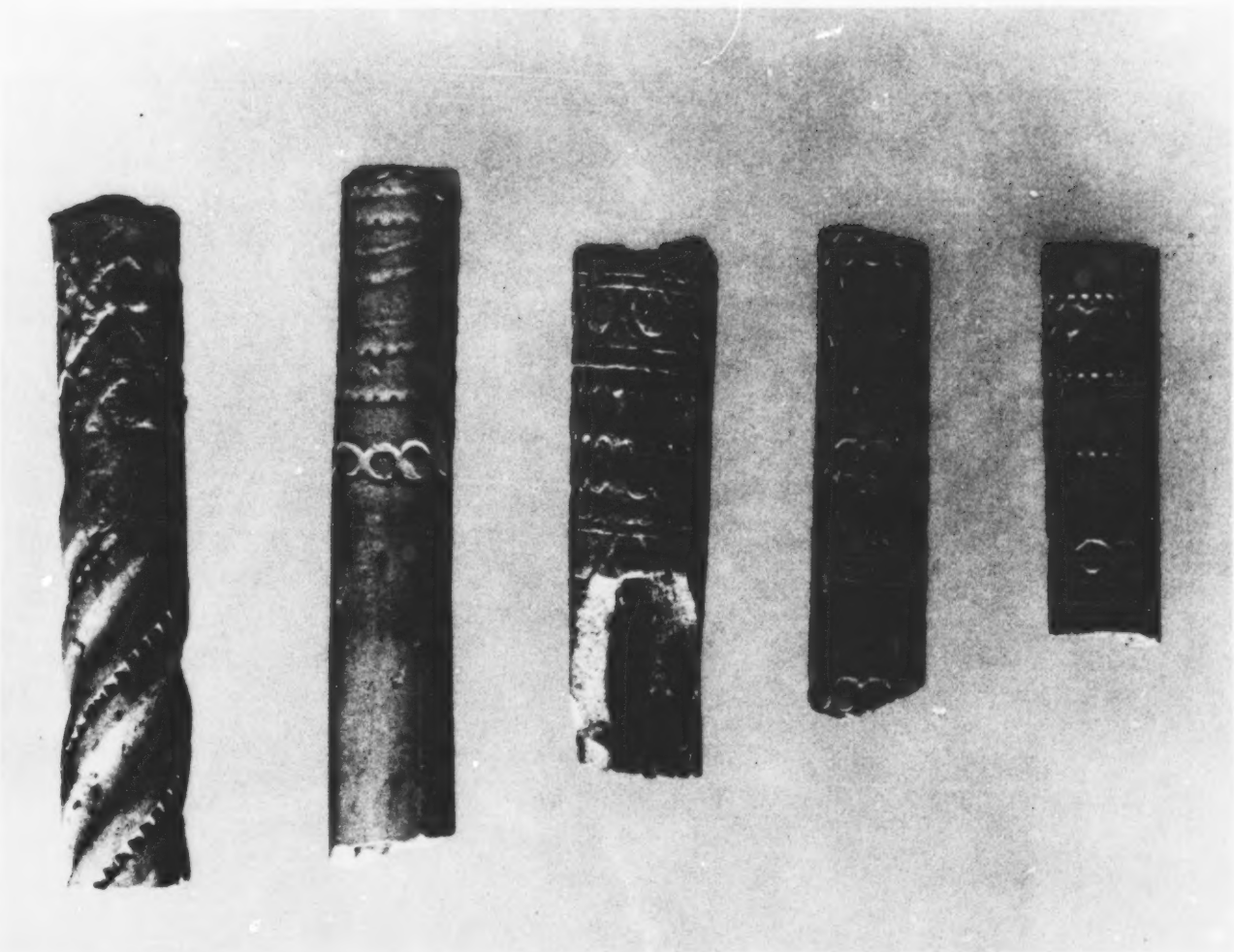
The stem fragment with the letters IHN together with the barbell-like motif is almost certainly of Dutch origin, but the inscription is too fragmentary for possible identification.

An unmarked bowl from this casemate, 4W.3.117 (Fig. 47, *centre*), has an unusual form. It does not resemble any of Oswald's types nor does it appear to be Dutch. If it is English, the shape indicates that it is

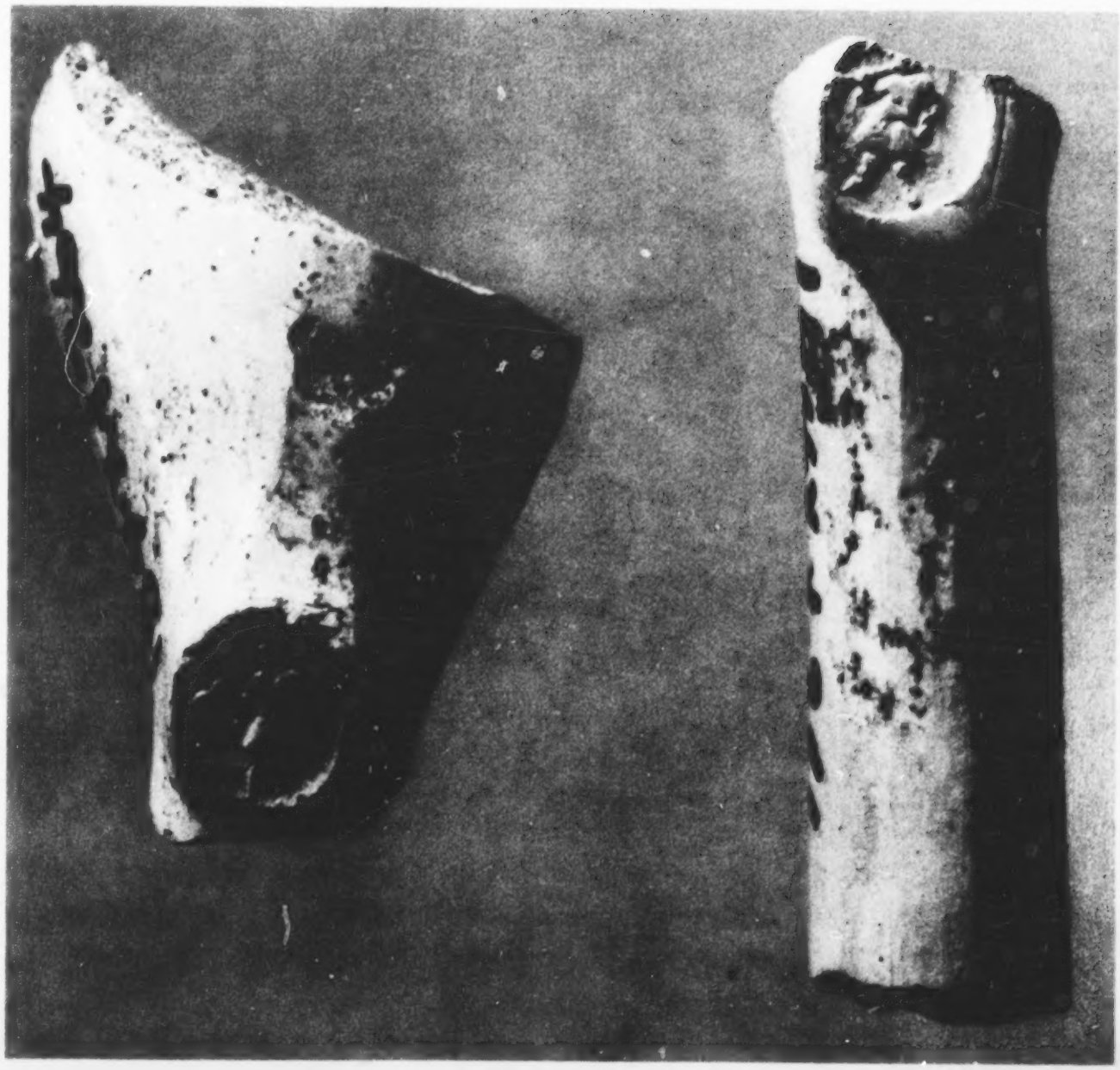
38 Dutch stem and heel fragment, showing decorated stem (cf. Fig. 22) and maker's mark comprising the letters LV crowned, with flying bird-like motif below. Context: 1720-32.

39 Stem fragment with IOHN STEP HENS impressed, the two Ns being retrograde and the TE and HE being monogrammed (*see* Fig. 15). Context: 1720-32.

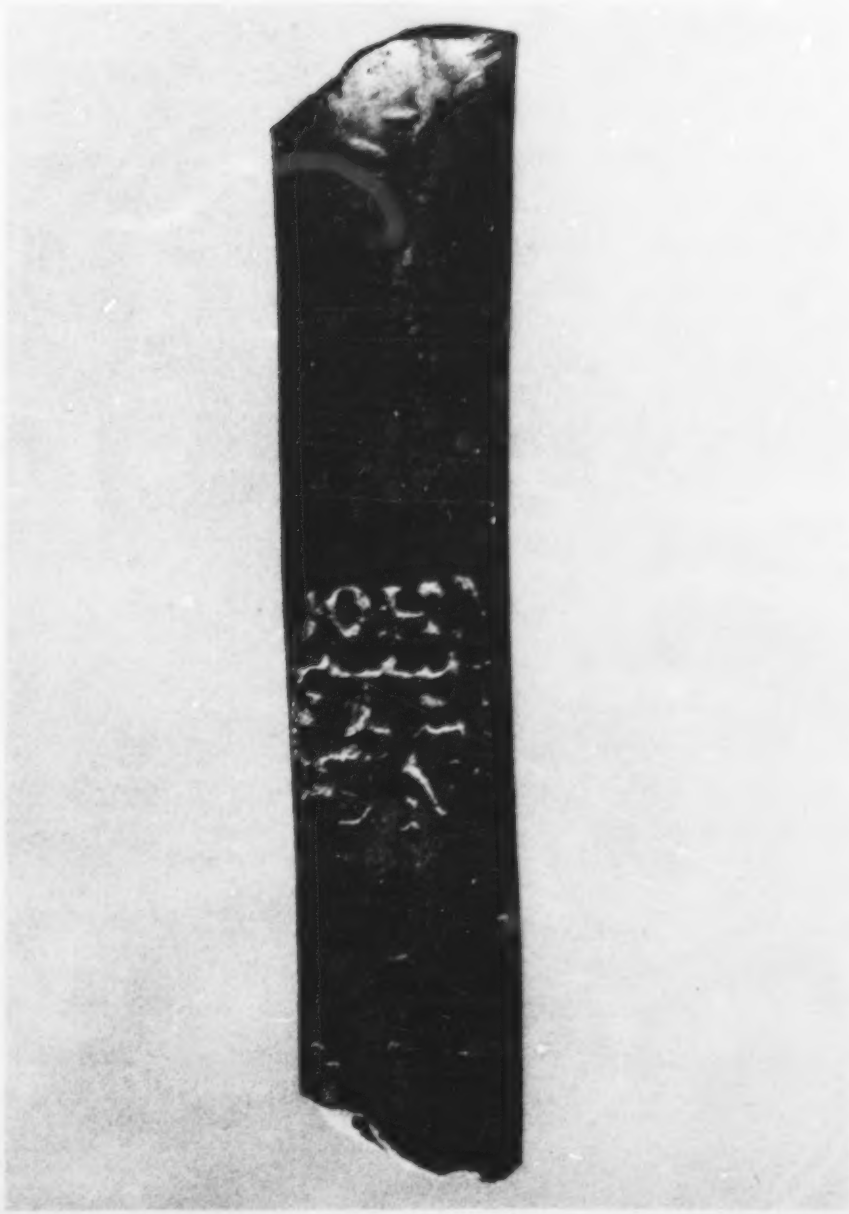
40 Various decorated stem fragments: *first left*, Dutch or English; *second left*, probably Dutch; *centre*, Dutch (cf. Fig. 38); remaining pair, probably Dutch. Context: 1720-32.



41 Two Dutch pipe fragments showing maker's mark of The Trumpeter (man blowing a post-horn) on heel. Context: 1720-32.



42 Stem fragment with IOHN/STEP/HENS impressed, the HE being monogrammed (cf. Fig. 15). Context: 1720-32.



later than about 1680, when Dutch influence apparently introduced the type of pipe already described as inspiring Oswald's type 9, for the bowl does show a general tendency towards this rather than the earlier English shape. The most reasonable assumption is that it must represent a rather early, and perhaps aberrant, example of this Dutch influence on the traditional English shape.

Casemate 14 Right

The only material that would appear to give indication of dating from Casemate 14 Right other than the John Stephens stem discussed earlier, is the fragment with the letters WM, each crowned, on either side of the heel. As already noted in discussing similar pipes from Casemate 1 Right, these initials occur at Williamsburg in contexts usually datable to about 1750-65; though one area in which pipes with these letters occurred was dated on a Binford analysis to 1740. In Casemate 1 Right, these letters occur twice in 1755-60 contexts and once in the layer that marked a floor level in 1755. There is a strong possibility, therefore, especially as this 14 Right fragment is the only example from these three casemates, that it is a stray from higher up in the rampart fill. As was noted, however, when dealing with the examples from Casemate 1 Right, pipes have been found with these initials, crowned and uncrowned, in London on bowls that are typologically datable from the late 17th century into the second half of the 18th century. It is possible that these letters were used by some makers as a trade mark – a less well-known and shorter-lived type of TD mark in fact – though one maker with these initials may have copied the idea of the crowns from another with the same initials.

The mermaid mark is the same as that described in Casemate 1 Right where the context was 1755-60. As noted when discussing Casemate 1 Right material, there is an ambiguous reference to 1745 being the date when this mark was registered. If this were the case, then this example, which is the only one from these casemates, would

also be an intrusive stray. At present, however, it is not possible to say whether or not this is the case.

The crowned LV is a typically Dutch mark, and while the bowl shape is not among the common Dutch shapes, it is of interest in that it may be related to a type that was allegedly introduced into England in 1688 by the followers of William of Orange when he became William III, and which inspired Oswald's type 9 shape and its variants. (Omwake's description of this prototype [1965: 13] does not agree with this identification except for the plane of the rim being parallel to the stem – unknown in other Dutch pipes from the 17th to the 19th centuries [cf. Friederich 1964a-d] – but the bowl shape of the crowned LV pipe may be of a similar type current at the same time.) Omwake notes that the type 9 prototype to which he refers did not apparently become popular in The Netherlands. He describes the bowl as being conical – a shape which became the standard Dutch bowl shape that later inspired the German porcelain pipe bowl shapes – but relatively upright, set to the stem at approximately 100° and with no heel. Dutch bowls usually, though by no means always, had heels, and invariably set at an obtuse angle to the stem, a feature that tended to become more extreme with time, and continued until the end of the 19th century (Brongers 1964a: 79; cf. Friederich 1964a: 11, Fig. 7). In view of the extremely rigid tradition of bowl shape among Dutch pipes, therefore, it is quite possible that types that were an attempt to set a new fashion failed. The type referred to here may have been manufactured at the same time as the type 9 prototype and, like it, failed to last in The Netherlands. Thus the shape of this pipe in itself may be an indication of an early dating in terms of the occupation at Louisbourg.

Neither of the other marks, both Dutch, offers much help with regard to dating. The trumpeter was first registered in 1674 but the first recorded owner is Jan Puyt who is recorded as a master pipemaker on 10 March 1738 (Helbers and Goedewaagen 1942: 196). According to this source, there is on the original stamp of this mark the legend "1769 January 3. Dit Merk hier in." The meaning of the Dutch phrase is obscure. Literally it means "this mark [is] in here;" however, if a date of 1769 is on the original stamp of a mark first registered 95 years earlier, then it either refers to the earliest surviving stamp or a re-registering of the mark after a period when it was not used. (This could also be the case with the mermaid mark which has "13 May 1745" on its original imprint.)

Another unresolved problem is that the depiction of the trumpeter in Helbers and Goedewaagen (1942: 96, Fig. 58) shows a coiled horn (i.e., a bugle) whereas these pipes depict a straight horn (i.e., a post-horn).

The other mark, which appears to be the letters CVC monogrammed with the second C reversed, cannot be traced at Gouda. The nearest approach to it is the emblem of the Dutch East India Company (used as a maker's mark), which comprises the letters VOC (Vereenigde Oost-Indische Compagnie) with the O and C on the arms of the V. Its first recorded owner is a Simon van Loon, noted in 1835, and it was registered with the firm of Jan Prince and Company in 1881 (Helbers and Goedewaagen 1942: 128, 193, 197, No. 198). That it was known in the 18th century, however, is indicated by its appearance on a portable board of pipe marks (Helbers and Goedewaagen 1942: Pl. VIII) but with an A above the other letters. Unless the mark found here could conceivably be an unrecorded earlier and inaccurate version, however, it seems unlikely that there is any connection.

The fragment bearing the small portion of a raised circular medallion might be a Robert Tippet pipe, as pipes of this type were found in Casemate 15 Right; but as noted when dealing with the letters EC in a similar medallion found in Casemate 1 Right, other marks inside circular medallions are known from England, especially the West Country, and are datable to the early 18th century.

As regards general dating evidence, all Dutch marks in 13 Right, 14 Right, and 15 Right are without the Gouda coat of arms, which is strong although not conclusive evidence that these deposits cannot be later than 1740.

One unmarked bowl, 4X.1.270 (Fig. 46, *left*), belongs to a type dated by Oswald (1960: 51, Fig. 21, No. 7) to 1690-1730, and by Atkinson (1964: type 8, *facing p.* 73) to about 1720 in southeast England. Its occurrence in this casemate is therefore entirely in keeping with the historical evidence.

Casemate 15 Right

In Casemate 15 Right there are two stem fragments which appear to have been made by John Stephens of Newport and three bowls made by the Tippet family which constitute the direct dating evidence.

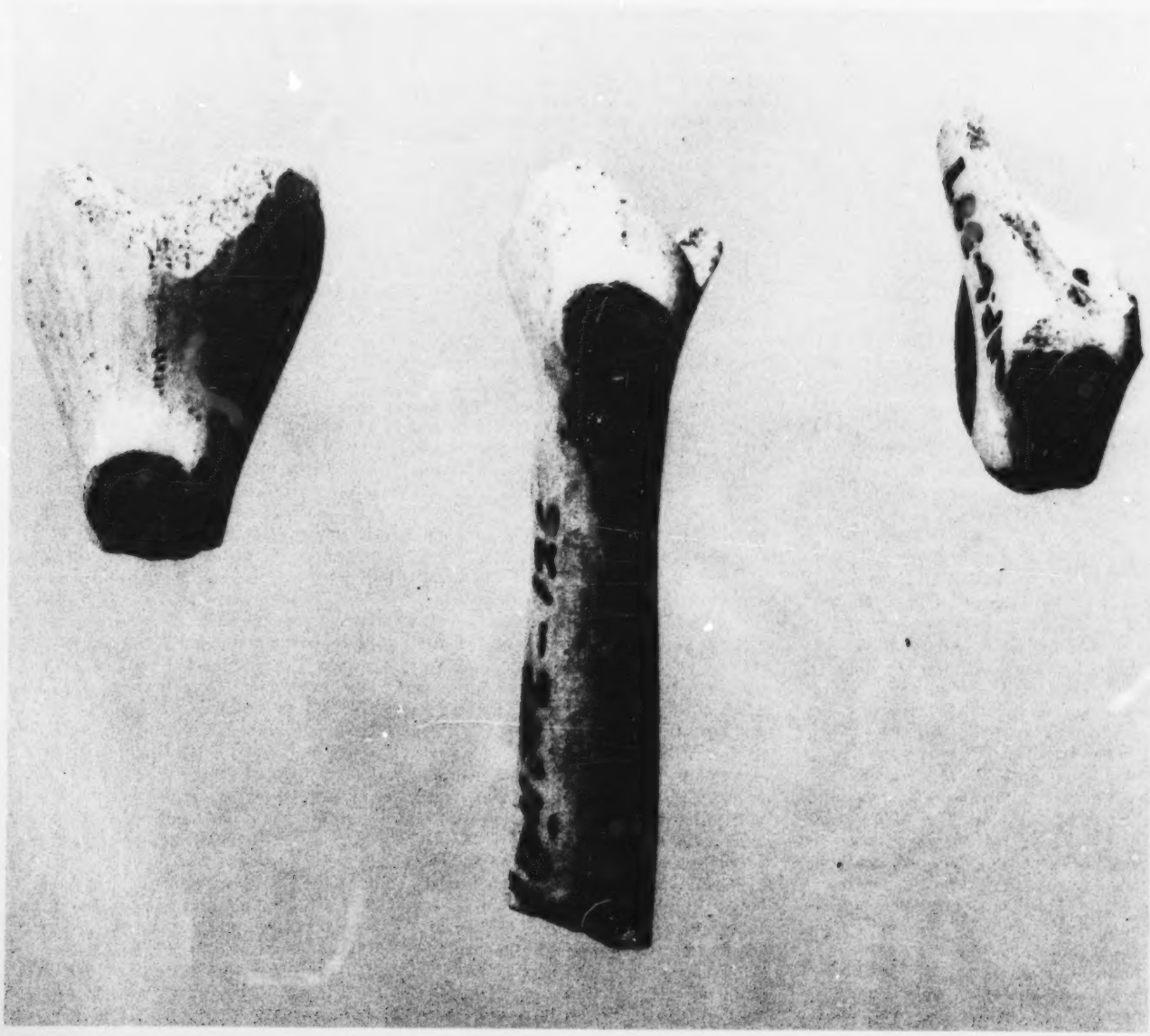
As noted when dealing with the John Stephens stems from Casemates 13 Right and 14 Right, the occurrence of two Stephens stems here reinforces the opinion already expressed that Stephens must have been working for over 20 years previous to the only recorded mention of him.

Tippet pipes have already been discussed in detail with the material from Casemate 1 Right. The bowl form indicates, as expected, that these pipes were made by either the widow of the first Robert Tippet, or the second or third Robert, the second becoming a freeman in 1678 and still working in 1713. Either he or his son (possibly the latter) is mentioned in 1724. Thus the occurrence of these pipes would agree with the historical dating for these casemates.

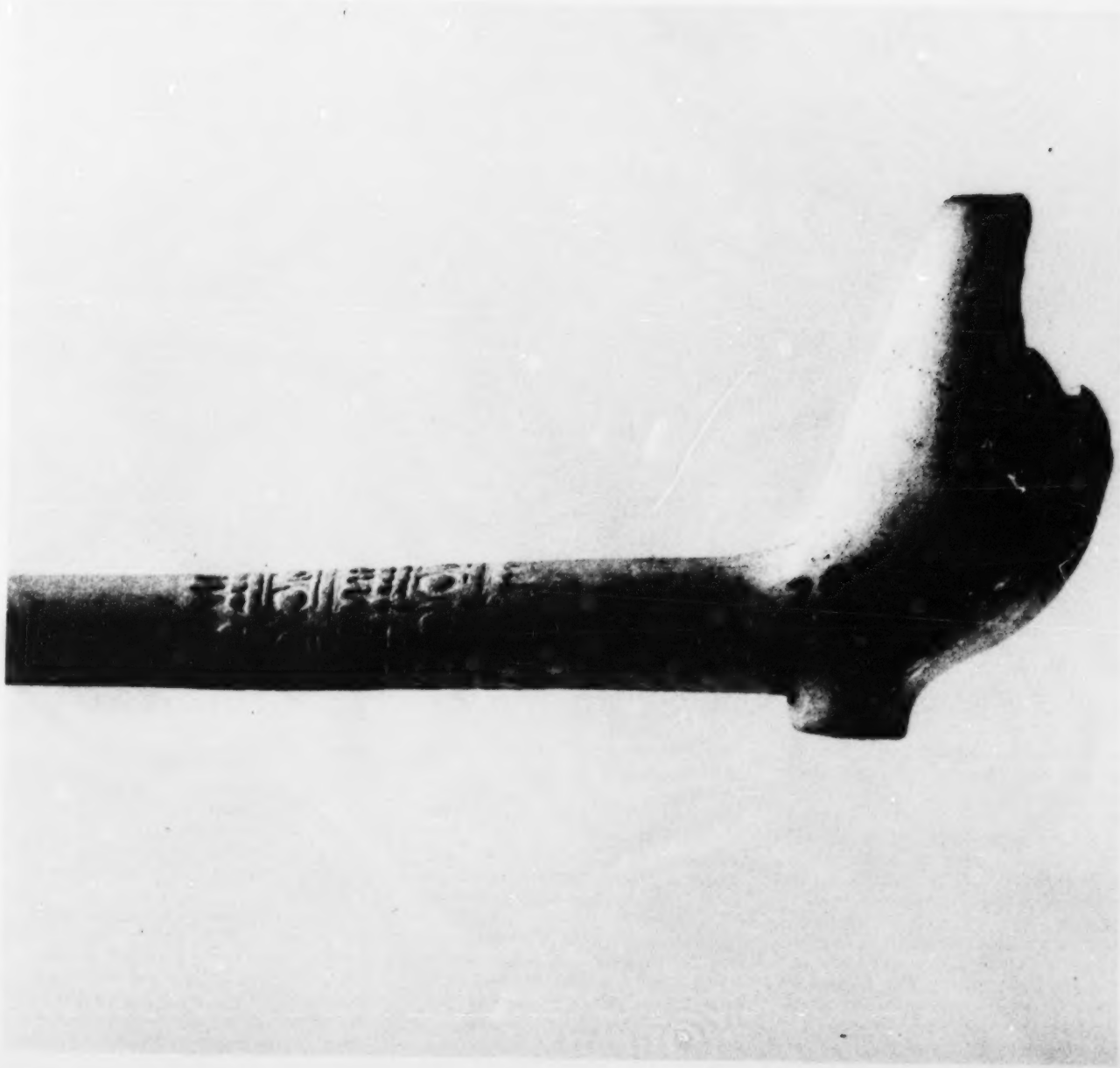
The other marks – two trumpeters, one with the letters CVC and one with the crowned LV – indicate the contemporaneity of the three casemates.

The ornately decorated stem fragment 4Y.1.5 (Fig. 40, *extreme left*) has decoration similar to two patterns found on pipes from Chester, England (Webster and Barton 1957: 24, Fig. 1, Nos. 7 and 8; 20) and also on one from Amsterdam, The Netherlands (Douwes 1964: 364, Fig. 1). The former were associated with material from the first three decades of the 18th century. The dating of the latter was not stated. If the lattice pattern of diamonds on this stem did contain

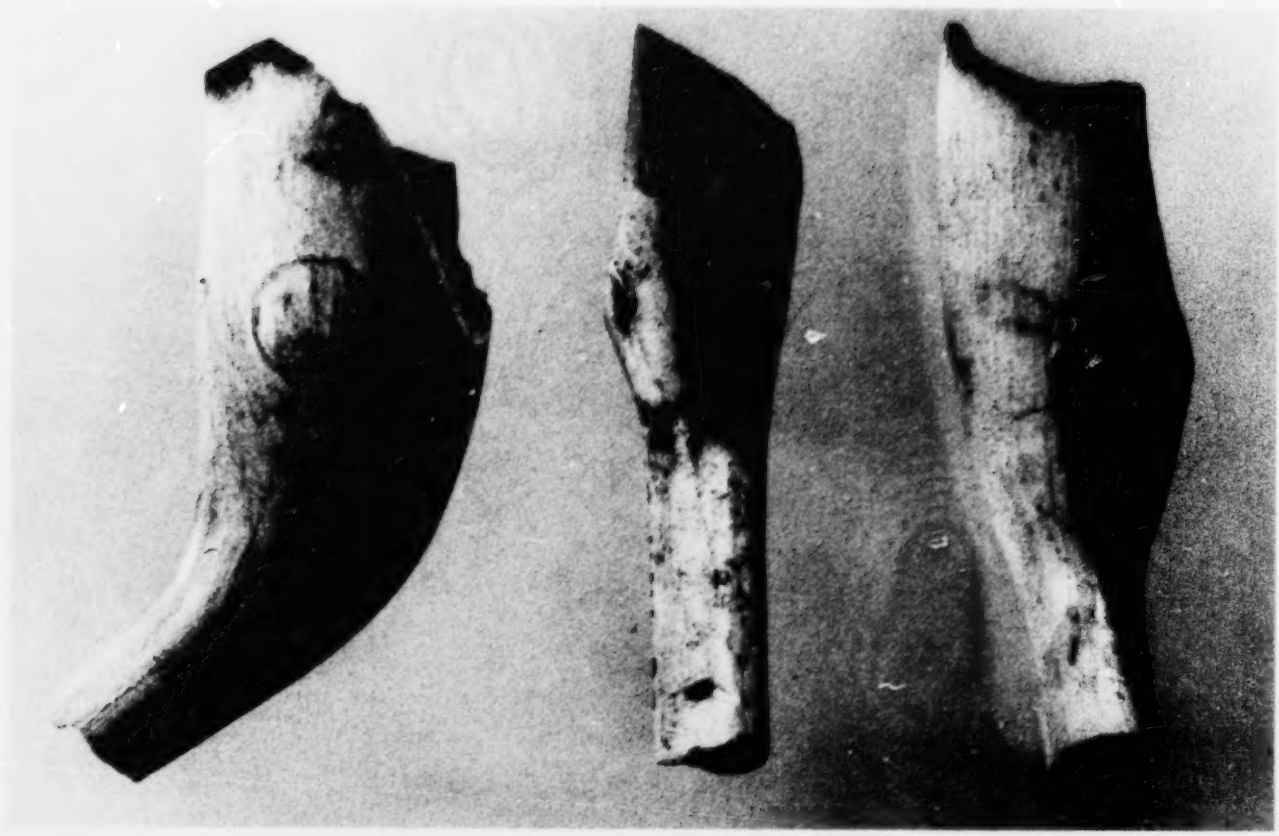
43 Three Dutch pipe fragments with heel mark comprising what appears to be the letter V with a C and a reversed C superimposed on the arms of the V. Context: 1720-32.



44 Dutch pipe with same stem decoration and maker's mark on heel as Figure 38; bowl shape, unusual for Dutch pipe, may be prototype of Oswald's English type 9 series. Context: 1720-32.



45 Three Robert Tippet pipe fragments (cf. Fig. 18). Context: 1720-32.



fleurs-de-lis originally (this part is too badly worn to show what, if anything, the diamond impressions contained), it would probably be Dutch in origin. Stems with this type of decoration have been found in London (Price 1900: 236-7, Fig. 20; Dunhill 1924: 222-4, Figs. 217-8, 220; Oswald 1960: 50; 1961: 56), Kingston-upon-Hull (Sheppard 1912: 15-16, 23, 27), and York (O'Neil 1961: 379, Fig. 1, *5*, 378, 380) in England; in Amsterdam in The Netherlands (Sleen 1963: 260-3; Brongers 1964b: 54, Fig. *d*); at Green Spring Plantation, Virginia (Caywood 1955: Pl. 16), at the Oscar Leibhart site, Pennsylvania (Omwake 1959: 130, Fig. 20, *3-4*, 133-4), at the Schurz site, New York City (Omwake 1958: 10, Fig. 1), at Maspeth, greater New York (Solecki 1948: 328, Fig. 2, 329), and at Fort Shantok, Connecticut (Salwen 1966: 29, Fig. 11, *b*).

They appear to be unanimously dated to the 17th century and to be considered of Dutch origin. Omwake gives detailed evidence, noting the early use of the fleur-de-lis mark at Gouda (cf. Brongers 1964a: 46). However, since the decorated stems mentioned above date to the 17th century and since Chester pipemakers were evidently producing elaborately decorated stems in the earlier part of the 18th century, such stems in an historically dated context of 1720-32 could plausibly have come from Chester. The latter could have been ultimately Dutch in inspiration, for although Dutch pipes would have been less likely to arrive in Chester than in London and other centres near the eastern coast of England such as Hull, York, and Colchester, if once Chester pipemakers had started to produce elaborately decorated stems, then any motif which a maker thought attractive would be used. (At Colchester there is a possibility that a Dutch pipemaker was working in the second half of the 17th century [Blake, Hurst and Gant, 1961: 49] though at present this seems

46 English stem fragment with number 3 impressed or incised under the bowl. Context: 1720-32.

an isolated example.) It is thus possible that the diaper pattern of fleurs-de-lis in lozenges illustrated by Webster and Barton does ultimately come from an earlier Dutch design.

As for the stem under discussion, 4Y.1.5, the worn state of the lozenges precludes certain identification. The spiral pattern with rouletting on the top of the ridge is exactly paralleled in The Netherlands, and on a probable Dutch stem from St. Francis Xavier IV, 1696-1718 (Béchard, personal communication) though there are similar twisted stems from Chester; and while the diaper pattern of lozenge-enclosed fleurs-de-lis is found at Chester similar designs are common in The Netherlands. If the stems with floral decoration found in Casemate 1 Right are from Chester, the chances of this example coming from there are increased, but at present it seems safer not to decide whether this stem is English or Dutch.

As to general dating, neither the fragment with the letters CVC nor the two with the trumpeter bear the coat of arms of Gouda, which suggests this layer may not be later than 1740. Further, the occurrence of these two marks both here and in Casemate 14 Right suggests at least a broad contemporaneity. It should be noted, too, that all the fragments bearing the monogrammed CVC, both in this casemate and in Casemate 14 Right, have a peculiar protrusion where the heel joins the stem on the side facing the smoker. This protrusion, seemingly overlooked by the pipe trimmer, is apparently caused by a flaw in the mould, which suggests that all these pipes came from one mould, and perhaps even one shipment.

One bowl, 4Y.1. no object number (Fig. 47, *right*), may be from a Broseley pipe of Oswald and James' type 5 (Oswald and James 1955a: 189, Fig. 5, 190) datable to 1670-1730. The shape and size of the heel are compatible with this identification, as is the outline of the part of the bowl facing the smoker, and enough of the rim of the bowl remains to show that its plane was not parallel to the line of the stem. Broseley

47 *Left*, English bowl, datable on shape to 1690-1730; *centre*, presumably English bowl of hitherto unmatched shape; *right*, fragment of possible Broseley bowl with large heel, datable to 1670-1730. Context: 1720-32.

makers usually placed their initials or name on the large heel, but not apparently with this example.

The Broseley industry reached its height during the second half of the 17th century, and it appears to have had some trade abroad. A few Broseley pipes have been found in North America (Oswald and James 1955a: 188; Oswald 1960: 48); for example, one possibly made by John Clarke, active in the earlier 17th century, from the Joseph Howland Site, Massachusetts (Deetz 1960a: eighth page), three possible examples all datable to the second half of the 17th century from an unpublished site at Newport News, Virginia (Pearce, personal communication), and one from Minute Man National Historical Park, Concord, Massachusetts (Snow, personal communication) datable to about 1700.

Summary

The following table shows which marks (including probables) occur more than once in the three casemates.

It would seem, therefore, that this study has been useful in bringing to light two hitherto unknown Dutch, presumably Gouda, marks; in giving an example of a possible Dutch prototype of the English type 9 bowl; in confirming the intricate decoration on the stem of the pipes with the crowned LV as Dutch; and in suggesting that John Stephens of Newport was working about a quarter of a century earlier than documentary sources had been able to show.

Casemate	Crowned LV	JOHN STEPHENS	Monogrammed CVC	Trumpeter	ROBERT TIPPET
13 Right	1	3			
14 Right	1	1	7	5	
15 Right	1	2	1	2	3*

*includes a possble J(o)ane Tippet pipe

Despite the fact that the material from these casemates come from an exclusively French period in the occupation of the fortress a large amount (though it is difficult to say what proportion – perhaps half) of it is English (Fig. 48), and the rest is Dutch. At least eight unmarked English bowls came from Casemate 14 Right and fifteen from Casemate 15 Right. This can be explained by the fact that at this time there was virtually no native French pipemaking industry.

Unfortunately, there is no comprehensive study of the French pipemaking industry. The first known French clay pipemaker is one Vausselin of Avignon about 1670, and two brothers van Slaton – presumably Dutch – were working there in 1692, but it is not until the second half of the 18th century that a real French pipemaking industry arose, first at Givet in the Ardennes and later in the Pas-de-Calais, according to Fresco-Corbu (1962: 1,445). Snuff remained the only French way of taking tobacco among the upper classes until the 18th century (Laufer 1924: 54). By the 1750s and 1760s, pipes were being made at Dunkirk and St. Omer. Some of the best clay came from this area of northeast France, and from Belgium, from where it also went to Gouda (Duhamel du Monceau 1771: passim; Diderot 1713-84, IV: 375). Trade figures quoted by Oswald (1960: 48; cf. Oswald 1959: 59-60) for the port of London between Michaelmas (29 September) and Christmas, 1698, show that nearly 45,000 gross[3] pipes were exported, of which 41,000 went to France compared to nearly 2,500 to Virginia and Maryland, indicating a very considerable trade with France and implying that there was little in the way of a native French industry. This year, 1698, was only one year after the end of the War of the League of Augsburg when England and The Netherlands fought France.

Statistical Dating

The Binford formula applied to the material from Casemate 1 Right gave considerable help when studying that material in relation to the archaeological sequence. When applied to the right face casemates, however, the formula resulted in dates ten or more years later than had been expected from the historical evidence, and, to some extent, from the study of the pipe material itself, as the figures above show.

As an experiment, the material was also measured with the grooved end in the two ways described in dealing with the Casemate 1 Right material. The same sequence of dates was observed, but in this case it was the earliest dates that provided the only ones acceptable on other evidence. The grooved end, loose fit date was a year or two earlier and the grooved end, tight fit date was ten or more years earlier still.

As an additional experiment, the material from Casemate 14 Right, which had been excavated during two seasons and had been given different catalogue numbers for each season, was divided into these two groups and the dates calculated. The 398 measurable fragments from the earlier material, catalogued 4F, gave a date (using the butt end of the drill) of 1740.55; the later material, catalogued 4X, and amounting to 329 fragments, 1736.68.

The Binford date is the theoretical median point in the occupation of the site which, for this area, would be 1726. Binford, however, pointed out several practical difficulties in the determination of the true median date, the most obvious of which in the area under discussion is that the material need not have accumulated at an even rate over the 12 or so years that the area was in use. Nevertheless, dates somewhere between 1720 and 1732 should have resulted from the analyses shown, while in fact the dates derived from the orthodox measurements were between six and ten years too late at a minimum.

Casemate	Binford Date	No. of Stems Measured
13 Right	1741.31	164
14 Right	1738.64	728
15 Right	1741.31	319

Casemate	Butt End	Grooved End, Loose Fit	Grooved End, Tight Fit	No. of Stems Measured
13 Right	1741.31	1740.93	1729.45	164
14 Right	1738.64	1736.72	1722.57	728
15 Right	1741.31	1738.64	1726.01	319

From the historical evidence it seems reasonably certain that these casemates cannot have remained open beyond 1732. The pipe marks do not give any absolute evidence one way or the other, although the absence of the Gouda coat of arms on any of the Dutch bowls strongly suggests that they date to earlier than 1739-40; so we

48 Six examples of Oswald's type 9 English pipe shapes. Context: 1720-32.

are thus left to conclude that the Binford formula, which is entirely a statistical method of deduction, is probably in error here.

Harrington's principle was based on the fact that bore diameters on pipes between about 1620 and 1780 diminished fairly steadily in size coinciding with the fashion of increased stem length (cf. Oswald and James 1955a: 188). As Harrington noted (1954: first page), however, the short-stemmed "dudeen" in Ireland and the "cutty" in Scotland were in use by the end of the 17th century (Deane 1914: 5; cf. Jewitt 1863: 76-7; 1878, 1: 293; and Thursfield 1907: 163) and the use of long and short pipes appears to have been a matter of social custom – it certainly was so by the end of the 18th century in England (Fresco-Corbu 1964: 1,286) and appears to have been so in The Netherlands from the introduction of smoking (North Carolina 1960: 81-2; cf. Corti 1931: 188, Fig. 42, 189). There is no reason to think that these short-stemmed pipes differed in their bore diameters from the longer-stemmed variety; unless, because the pipes were cheaper, some of the out-of-date larger wires were used in their manufacture; but differing lengths of stem would reflect on the number of fragments found and therefore (in theory) on dating evidence. Actually, dudeens and cutties do not appear to have reached the New World in colonial times (Omwake 1965: 27). It has to be emphasized, however, that the trend towards smaller bores was a gradual process. Harrington found, for example, that the 6/64 in. bore, which achieved its maximum frequency (nearly three-quarters of all the material) during the period 1680-1710, first occurred in the period 1650-80 and was still found, though rarely, in the period 1750-80.

As remarked earlier, the amount of Dutch material in the pipes from these casemates is uncertain, but it may have been approx-

imately half of the total. This may be the cause of the difference between the calculated dates and those suggested by other evidence, for if Harrington's observations for the 17th century hold for the 18th century, the application of his graph for English pipes would result in a later date when applied to Dutch material. Further deposits containing large amounts of Dutch material would have to be analyzed before a definite statement could be made.

The use of the Binford formula on the material in these casemates, therefore, seems to confirm the opinion expressed in the study of the material from Casemate 1 Right: it should not be regarded as a substitute for historical research, but for deposits containing little or no other evidence it is useful.

Endnotes

1 It is difficult to trace this attribution to its source. Croker (1835: 30) correctly, though not on entirely accurate grounds, attributed this and the related types 7 and 8 – dated by Oswald (1960: 58) to about 1670-1710 and about 1680-1720, respectively – to the reign of William III. Lamb (1852: 30-1) appears to have been the first to suggest a possible continental origin for these types, from their appearance on campsites of William's troops during the English Revolution. Unfortunately, he appears to have confused his references to his illustrations, and the types to which he refers are not the types he probably means (cf. Smith 1860: 211-2). Smith, Fairholt (1859: 169), and Jewitt (1863: 76-7; 1878, I: 293, 295) follow the ascription of these pipes to William's time on the grounds of their discovery in his camps, but they do not specifically suggest they could have been of Dutch origin or inspiration. Certainly the period of 1670-1710 sees the widespread introduction of these shapes in England (cf. Atkinson 1964: Pl. *facing* p. 73; Parsons 1964: 236, Fig. 1, 237, 238; and Oswald 1961: 59, Fig. 1, and 61, Fig. 2). In a deposit sealed in 1683 in Durham, Parsons found only one pipe of this general class: a Marlborough, Wiltshire, import (additional information from J. E. Parsons at Autumn Conference of the Society for Post-Medieval Archaeology, Durham, November, 1967).

2 The information here and elsewhere on the important Tippet family has been rewritten to include documentary evidence from the writer's Bristol research: dating given here thus does not always agree with statements in Omwake 1958 and Oswald 1969.

3 A pipemaker's gross was greater than the normal 144 during the manufacturing process to allow for breakages. Fleming (1923: 240) says 200; Brongers (1964a: 140, n. 1), 160, but it seems that the number changed with the stages of the process. At Andenne, Belgium, a gross was 174 at the trimming stage, 168 at the polishing stage, and 144 after the firing stage in the 1930s (Javaux 1935: 10). At Gouda in the 18th century a moulder's gross was 168 and of this, 8 were kept to recompense a worker who broke a pipe (Duhamel du Monceau 1771: 23-4). In the present Gouda pipe industry the gross is initially 180; after stoving, 160, and after firing, 144 (Terstraeten [1968]: 18). At McDougall's in Glasgow a gross was formerly 192 in the early stages of the process (Walker and Walker 1969: 134).

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